

Young adults' perceptions of digital health technology for improving exercise: A qualitative study

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Abstract

Objective: More than half of Korean adults do not meet aerobic exercise guidelines, and participation continues to decline. In response, digital health technologies such as mobile applications, wearable devices, artificial intelligence, and the Internet of Things are being used to promote exercise. This study investigates how young adults perceive digital health technologies for exercise.

Methods: This was a descriptive qualitative study. Data were collected from 24 participants in their 30 s using semi-structured interviews conducted between June 3rd and August 2nd, 2024. Participants were initially recruited through university bulletin boards and subsequently via snowball sampling.

Results: The following four main themes with corresponding subthemes emerged from the data analysis: (1) increased-need for health management, (2) changing perceptions of exercise, (3) limited digital health experience, and (4) expectations for digital health.

Conclusion: The use of digital technology for exercise is influenced by factors such as awareness of health changes, evolving values around health and appearance, social and economic motivations, and personal experience with the technology. Adults in their 30 s who are facing growing health concerns and real-life constraints tend to assess the usefulness of these tools based on their practical benefits. Although most participants were office workers with relatively high levels of education—factors that may have shaped their experiences—these findings offer insights into how young adults engage with digital health technologies. Nurses and other healthcare professionals should design, implement, and evaluate interventions that enhance engagement, address emotional needs and motivational factors, and promote long-term behavior change.

Keywords

Digital health, perception, exercise, young adult, health management

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Introduction

Regular exercise in adulthood reduces all-cause mortality; lowers the risk of developing hypertension, certain cancers, and diabetes, and benefits mental health by reducing anxiety and depression.¹ There is generally a consistent curvilinear dose-response relationship between positive health outcomes and regular exercise.² However, despite this evidence, more than half of Korean adults do not meet aerobic exercise guidelines, and the rate of aerobic exercise has been on a downward trend, decreasing from 58.3% in 2014 to 45.6% in 2020.³ Specifically, the rate of exercise among Koreans in their 30 s is the lowest across all age groups, showing a decrease of over 20% compared with

the activity rate of those in their 20 s.⁴ Moreover, health management indicators regarding chronic diseases for this age group are not only poorer than those for older adults,⁵

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but this period also marks an increase in disparities in cardiovascular disease risk by income level.⁶ Therefore, there is an urgent need to develop strategies to improve health management and increase exercise among young adults in their 30 s. Healthcare providers should develop, implement, and assess the effectiveness of tailored interventions aimed at promoting healthy exercise levels among young adults.

Several intervention studies aimed at improving exercise among young adults have been conducted.⁷ Specifically, digital healthcare, which utilizes information and communication technology to monitor and manage well-being and health is already widely applied in various aspects of healthcare.⁸ Digital health technologies such as applications,⁹ wearable devices,¹⁰ artificial intelligence,¹¹ and the Internet of Things¹² are also being utilized to improve exercise across various target groups. A recent meta-analysis evaluating the effectiveness of exercise programs using digital technologies suggests that gamification effectively promotes exercise across diverse populations and has a long-lasting impact.¹³ Furthermore, adding virtual reality is known to potentially maximize the effects of exercise games by encouraging immersion and enhancing enjoyment.¹⁴ Despite such evidence, digital health interventions also have limitations. For instance, poor long-term adherence is often a feature of mobile apps, as users may lose interest over time or find the app's features insufficiently engaging.¹⁵ Additionally, mobile health technologies face challenges such as ensuring seamless data synchronization and storage, maintaining data reliability, accurately interpreting collected information, addressing security and privacy concerns, optimizing battery efficiency, and mitigating signal interference issues.¹⁶ Wearable devices also face challenges such as data inaccuracy, limited user and clinician acceptance, and issues related to cost, accessibility, and long-term engagement.¹⁷ The limitations of artificial intelligence interventions for promoting exercise include a lack of standardization in design and reporting, making it difficult to compare results across studies,¹¹ and a shortage of robust randomized controlled trials to measure effectiveness.¹⁸ These challenges highlight the need for more tailored, user-friendly, and secure digital health interventions to optimize their effectiveness in promoting exercise.

To develop interventions, it is crucial to conduct formative studies, such as focus group interviews or in-depth interviews, to understand the needs of the target populations.¹⁹ Variables that promote or hinder exercise in individuals include socioeconomic characteristics such as age and gender, marital and educational status,²⁰ and self-perception of health status.²¹ Therefore, for digital technology-based exercise intervention programs, it is necessary to develop specialized programs that set the difficulty level according to the user's capabilities and consider factors that promote or hinder exercise for the specific target group.²² Specifically, for young adults their 30 s is a period marked by developmental life stages such as marriage and

childbirth and by active participation in economic activities, which is a time when the rates for participation in exercise tend to fall.²³ In Korea, this trend is especially evident, with the average ages for first marriage and first childbirth in 2024 being 33.9 and 33.8 years, respectively.²⁴ Many individuals in their 30 s face simultaneous life transitions and lifestyle changes, contributing to a unique socio-cultural context. However, most existing research has focused on individuals in their 20 s or on mixed-age groups, leaving the specific experiences and needs of those in their 30 s relatively underexplored.

Study aim

The aim of the study was to explore the perceptions of young adults in their 30 s regarding digital health technology for exercise. The central question was: "What are young adults' perceptions of digital health technologies for exercise?"

Methods

Design

A qualitative descriptive design with an emphasis on inductive content analysis was used to explore the perceptions of adults in their 30 s regarding digital health technology for exercise. Thematic analysis was used to derive the main themes and subthemes from the interview data.²⁵ Guided by a constructivist–interpretivist paradigm, the study sought to capture the complex and context-dependent perceptions of young adults toward digital health technologies. This study adhered to the Consolidated criteria for Reporting Qualitative research (*COREQ*) guidelines (see Supplemental Material).

Participants

The participants, all young adults in their 30 s, were initially recruited through a notice posted on university bulletin boards, and additional participants were subsequently recruited using snowball sampling through personal networks. Recruitment ceased once data saturation was achieved, and all authors confirmed that the data were fully saturated. Data saturation was considered to have been reached when no new codes, categories, or themes emerged from successive interviews, and the research team jointly agreed that additional data were unlikely to yield further meaningful insights. A total of 24 participants were enrolled, including 9 males and 15 females. No participants dropped out during the data collection and analysis phases of the study.

Inclusion & exclusion criteria

Participants were included in the study if they were young adults in their 30 s residing in South Korea, were able to

communicate fluently in Korean, and could actively participate in an interview. All participants were required to understand the purpose of the study and provide voluntary written informed consent before participation. Individuals were excluded if they had difficulty communicating in Korean, were unwilling or unable to participate in an in-depth interview, or did not meet the age or residency criteria described above.

Data collection

This study was conducted in the research laboratory of one of the authors in the Department of Nursing at Chung-Ang University in Seoul, South Korea. Data collection took place from June 3rd, 2024 to August 2nd, 2024. One nursing faculty member and one researcher with a master's degree, both with prior experience in qualitative research, conducted all the interviews. Both interviewers were female and had completed graduate-level courses in qualitative research methodology. Each participant chose the location for their interview, which was either the author's office or an empty classroom. The interviews lasted between 40 and 60 min.

The interview guide was developed following a thorough review of relevant literature on digital health technologies and exercises and was subsequently refined through discussions among the research team, all of whom have expertise in qualitative research and health behavior. The guide was semi-structured and centered on one primary open-ended question—"What are young adults' perceptions of digital health technologies for exercise?"—as well as several follow-up and probing questions, such as: "What are the experiences and perceptions of young adults regarding the use of digital health technologies for exercise?"; "What expectations do young adults have regarding digital health technologies for exercise?"; and "Is there anything else you would like to share?" The questions were organized to progress from general to more specific topics, allowing participants to reflect on their personal experiences before discussing broader views on digital health technologies.

Prior to the main study, the interview guide was pilot tested with one individual from the target age group, and minor adjustments were made to improve clarity and flow. During the actual interviews, the author encouraged participants to express their thoughts fully. All interviews were audio-recorded, and nonverbal cues, and key observations made during the interviews were documented in field notes. Data analysis was conducted using the verbatim transcriptions of these recordings.

Data analysis

The collected data were analyzed using Braun and Clarke's²⁴ thematic analysis method, which identifies the

meanings of common themes. This study was grounded in an interpretivist paradigm, which assumes that participants' perceptions and meanings are socially and experientially constructed. Accordingly, an inductive analytic approach was employed to allow themes to emerge from the data rather than from predefined theoretical assumptions. The analysis was primarily conducted by the second author, but all authors collaboratively reviewed the data and engaged in discussions to identify and finalize the themes. All coding and data organization were systematically managed using Microsoft Excel to ensure transparency and traceability throughout the analytic process. The thematic analysis process consisted of six stages.

In the first stage, the transcribed data were read repeatedly to identify meaningful content related to the participants' experiences. In the second stage, 232 meaningful statements were extracted and coded. In the third stage, the codes were compared with potential themes, and all data related to these tentative themes were collated, resulting in 48 initial themes. In the fourth stage, the extracted themes were checked for consistency with the entire dataset, yielding 10 subthemes and four main themes. The fifth stage involved naming the themes, during which each theme's meaning was clarified and labeled. The final stage consisted of writing the report, in which the themes were described, and the content was reviewed. To enhance analytic rigor and minimize interpretive bias, researcher triangulation was maintained through ongoing discussions among the authors until consensus was reached.

Rigor and reflexivity

To enhance the rigor of the study, we continuously reviewed and analyzed the data throughout the research process and up until the conclusion of the findings to ensure its trustworthiness.²⁶ Additionally, participants were asked to verify the results to strengthen the credibility of the findings.

Results

The participants' sociodemographic characteristics are presented in Table 1.

As a result of the thematic content analysis, four themes and 10 subthemes were derived (Table 2).

Theme 1: Increase in the need for health management

Participants reported experiencing a decline in physical health over time, including symptoms such as fatigue, pain, and weight gain. While participants had prioritized aesthetic aspects and believed that a slim body type was ideal, their health standards had shifted. They now recognized the need to maintain appropriate muscle mass and

Table 1. Sociodemographic characteristics of the participants.

Participants	Sex	Age	Marital status	Occupation	Types of digital devices used	Current use of the listed device
Participant 1	Female	31	Unmarried	Lecturer	Watch	Y
Participant 2	Male	34	Married	Doctor	Watch, app	Y
Participant 3	Male	32	Unmarried	Graduate student	Exergame, app	Y
Participant 4	Female	33	Unmarried	Office worker	App	N
Participant 5	Female	31	Unmarried	Office worker	Watch, Exergame	N
Participant 6	Female	34	Unmarried	Office worker	Watch, app	Y
Participant 7	Male	32	Unmarried	Office worker	Watch	N
Participant 8	Female	34	Unmarried	Office worker	None	N
Participant 9	Male	38	Married	Office worker	App	Y
Participant 10	Female	39	Married	Self-employed	App, Exergame	Y
Participant 11	Male	38	Married	Optician	Watch	N
Participant 12	Female	32	Unmarried	Office worker	App	N
Participant 13	Female	30	Married	Office worker	Exergame	N
Participant 14	Male	32	Married	Office worker	App	N
Participant 15	Female	32	Unmarried	Nurse	None	N
Participant 16	Male	33	Unmarried	Office worker	Watch	N
Participant 17	Female	30	Unmarried	Office worker	Exergame	N
Participant 18	Male	35	Unmarried	Doctor	None	N
Participant 19	Female	30	Married	Office worker	None	N
Participant 20	Female	34	Married	Public servant	Watch	Y
Participant 21	Female	31	Unmarried	Nurse	Watch	N
Participant 22	Female	31	Married	Office worker	App	N
Participant 23	Female	32	Married	Teacher	App	N
Participant 24	Male	34	Unmarried	Public servant	Watch	N

Note. Y = Yes; N = No.

physical strength. Physical health was viewed as one of the ways to express oneself, and the participants were generally positive about capturing photos or videos and sharing them on social media.

Subtheme 1.1: Experiencing physical decline. All participants had felt their physical health change over time. These

changes were generally negative, and particularly noticeable when they overexerted themselves through exercise or work, and they noted that recovery took a long time. In daily life, they found themselves experiencing rapid breathing and reaching their physical limits quickly while walking up steep hills, traveling with friends, or engaging in physical activities. Moreover, the participants spent most of their

Table 2. Themes, subthemes, and units of meaning derived from thematic analysis.

Theme	Subtheme	Units of meaning
1. Increase in the need for health management	1.1 Experiencing physical decline	Feeling the body weakening, prompting the need for exercise.
	1.2 Changing standards of beauty to health	Shifted to valuing health and muscularity, influenced by social trends.
2. Changes in perceptions of exercise	2.1 The need for benefits to start and sustain exercise	Exercise brought muscle gain, pain relief, enjoyment, and rewards.
	2.2 Engagement with a partner is important	Exercising with others added motivation, enjoyment, and a sense of competition.
3. Limited digital health experience	3.1 Simple ability to record information	Digital devices tracked results and provided motivation through simplicity.
	3.2 Fun but temporary	Digital devices lost their appeal owing to repetition and decreased novelty.
	3.3 Feeling that digital health devices are too complicated	Unfamiliar digital health devices were confusing and tiring to use.
4. Expectations for digital health	4.1 Provision of individualized feedback	Emphasized the need for individualized feedback.
	4.2 Clarification of benefits	Clearly demonstrated benefits were expected.
	4.3 Increase in partner participation	Seen as a tool to support flexible and inclusive group exercise.

time sitting. Their activity levels had decreased compared with when they were in their 20 s, and, overall, they had gained weight and became more easily fatigued. A few participants were even diagnosed with conditions such as arthritis and varicose veins, and more than half of the participants reported experiencing pain in areas such as their shoulders, pelvis, backs, and knees. These physical changes often led to the conviction that exercise was necessary for maintaining health.

I gained weight and my physical strength decreased, and the pain in my shoulders and pelvis became so severe that I started receiving manual therapy. It only helped while I was getting the treatment, but the pain continued, so I realized I needed to correct the underlying issues. Pilates was said to be good for pelvic correction, so I had a consultation and I'm still doing it now. (Participant 6)

I gained a lot of weight, and as my body became fatter, I started experiencing knee pain often. ... After giving birth, I became physically exhausted, so that's why I'm exercising. (Participant 20)

Subtheme 1.2: changing standards of beauty to health. Participants had previously believed that being thin was the ideal, but as their health and beauty standards changed,

they had come to consider a muscular body to be attractive. Nearly half of the participants mentioned that their health and beauty standards had changed. They became more aware of their own well-being and developed an increased interest in exercise within a social atmosphere that respected personal hobbies. Specifically, seeing their peers post pictures of themselves managing their health on social media made them feel good and motivated them to start exercising as well.

I used to think that being very thin was good, but nowadays, I think a healthy body with muscle is more beautiful, and the health activities to maintain it look more appealing. (Participant 1)

These days, exercise and self-care is a trend, so many of my friends are into it, and the activities vary—some are doing tennis, CrossFit, joining running crews, hiking, and so on. I think the purpose of exercising has changed, and it seems like some people want to project the image of someone who exercises. (Participant 13)

Theme 2: Changes in perceptions of exercise

The participants reported that their roles in their family and in society had grown in number, and that they experienced

environmental changes that led them to feel that they had less time for exercise than when they were in their 20 s. Despite this, physical changes, enjoyment, and the economic rewards from program participation motivated them to start or continue exercising.

Subtheme 2.1: The need for benefits to start and sustain exercise. Participants felt that there were benefits to engaging in exercise. As they entered their 30 s, they noticed a decrease in the time available for exercise because of increased childcare responsibilities and social activities. Nevertheless, those who recognized the personal benefits of exercise continued to exercise. They experienced an increase in muscle mass, a reduction in pain, enjoyment, and even economic rewards.

Since I started swimming three times a week, my physical strength has improved. I chose swimming because it's not boring, and it's fun since it's an activity in the water. (Participant 8)

I once used an app where we competed in step counts, and if you reached a certain number of steps, you'd get a gift card. When I saw how many steps others had taken, it motivated me to walk more. Normally, I'd just stay at home, but the app made me get out and walk. I wouldn't have downloaded the app if there hadn't been any incentives. (Participant 19)

Subtheme 2.2: Engagement with a partner is important. Participants emphasized the importance of the engagement with others in their exercise. They reported that having commitments with a personal trainer or workout partners helped them to continue exercising, even when they did not feel like it. Exercising with others made the activity more enjoyable, and they felt motivated by the sense of competition. These social benefits were a key reason they preferred exercising with others in person rather than engaging in solo activities.

The biggest difference between using digital devices and going to a physical location is whether or not you're with others. It's like watching a concert at home alone versus being at a concert and enjoying the energy of those around you and hearing different sounds. When I exercise alone, I feel like I stop doing home workouts. (Participant 3)

When you do activities with others, a sense of competition naturally arises. Even on days when I don't feel like exercising, that competition motivates me to do a little more. (Participant 9)

Theme 3: Limited digital health experience

Participants expressed interest in new digital health devices, and almost all of the participants had used smartwatches,

InBody devices, and apps. Three-quarters of the participants had used these tools over an extended period to track their health information. For the most part, they used these devices to record their exercise, but if the devices were too complicated or interfered with their workouts, they discontinued using them. Interest in the devices was initially high but decreased over time, and the enjoyment of using them also declined, leading to them being abandoned.

Subtheme 3.1: Simple ability to record information. Participants appreciated that digital health devices allowed them to track the results of their workouts over a long period and feel a sense of accomplishment by observing changes in their records. The changes in results sometimes served as motivation to exercise more. In general, the participants used digital devices to record or track changes in their exercise results, preferring devices that were simple to use. The improvements in their results sometimes served as motivation to exercise more.

I always wear my smartwatch. I don't intentionally use it, but since it syncs with my phone, I check the records. When I see my heart rate go up, I realize I'm exercising, and I feel like I did a good job. (Participant 2)

The InBody scale is easy to use at home and syncs with my phone, which makes it convenient. I've been recording my results for over five years, and I've noticed my weight has increased, and my muscle mass has slightly decreased. I check it about once every couple of months. (Participant 18)

Subtheme 3.2: Fun but temporary. The participants were intrigued by new digital health devices and experimented with them. They mentioned that the content of exercise programs on these devices became repetitive and limited over time, causing their enjoyment to wane. They also noted that exercising to increase points or levels became less enjoyable once they reached a certain goal or were unable to surpass it. This reflects participants' psychological engagement. As the novelty diminished or the experience became repetitive, their initial excitement and enjoyment declined, leading to decreased motivation to continue the activity.

The exercise was more fun because it was in a game format, so it wasn't as boring as just exercising. However, because it was so easy to start, it was just as easy to stop and not do it anymore. (Participant 5)

When I think about why I couldn't continue for long, it was because personally, I reached a limit in following along. I think it became boring. After a while, I couldn't do the harder exercises, and I ended up just repeating the same things. (Participant 23)

Subtheme 3.3: Feeling that digital health devices are too complicated. The participants felt that using digital health devices could sometimes be complex and cumbersome, especially if they were not familiar with them. They preferred devices to be simple, lightweight, and convenient. In this context, perceived complexity referred not to motivational aspects but to practical and technical difficulties that interfered with consistent use. While more than half of the participants appreciated the advantage of being able to exercise anywhere without space restrictions, every participant noted difficulties, such as the challenges of performing large movements or jumping owing to noise issues in apartment buildings. Additionally, they found some digital health devices to be inconvenient because they required more effort than outdoor or gym-based exercises.

Since I live in an apartment, I'm worried about disturbing the neighbors downstairs. The movements can be big, so even though we use a mat and try to be careful, we still get complaints about the noise. (Participant 10)

New devices are often not simple to use. From connecting them to figuring out how to operate the device, there are many steps that can be difficult. (Participant 16)

Theme 4: Expectations of digital health technology

All participants used digital health technologies such as videos, smartwatches, gaming devices, and virtual reality devices. Based on these experiences, they expressed hopes for improvements in the future. They wanted devices to better reflect their current health status. When following preset programs, they felt that their personal preferences or limitations were not considered, and they were disappointed by the lack of guidance on correct posture or techniques. While they understood the long-term benefits of investing in digital health devices, they were not always able to articulate specific advantages. Overall, only one-third of the participants felt that the cost of the devices was high, and aside from smartwatches, only a few had purchased these devices. While nearly half were aware of exercise programs that connected people from different regions, they thought that such programs were not yet widespread. However, they expressed the hope that as digital health technologies become more mainstream, they would become more useful and accessible.

Subtheme 4.1: Provision of individualized feedback. The participants felt that while digital health devices could provide information about their current health status, they often lacked personalized feedback. They wanted digital health technology that could analyze their personal data and provide tailored advice and real-time feedback on their exercise routines. However, they were concerned about exposing sensitive personal information and preferred that their data be used within privacy limits.

It would be more reliable if the system gave me a program or advice based on my health data, such as "you need to work on this area." It would be great if it was more personalized. (Participant 4)

When I go in person, the coach can correct my posture if I'm doing something wrong. But with digital devices, there's no one to guide me, so that's inconvenient. (Participant 17)

Subtheme 4.2: Clarification of benefits. The participants mentioned that digital health devices sometimes came with an initial cost and required payments for additional programs, but they found it difficult to justify the purchase if they did not feel immediate benefits. In contrast, they continued activities like swimming, playing tennis, or going to the gym despite the costs because of improvements in fitness, posture correction and the enjoyment of group exercise. In general, the participants felt that the costs of virtual reality devices and other digital health equipment were high.

I think that health management or exercise needs some level of enforcement or reward to be effective. Simply relying on a device to manage health doesn't provide that pressure, nor does it offer rewards to the user. While devices may help set the stage, I don't feel they directly impact health. (Participant 6)

It's not just for fun. There needs to be a clear reason why it's beneficial. If it's just fun, people who are serious about their health won't use it. (Participant 11)

Subtheme 4.3: Increase in partner participation. The participants noted that it was difficult to schedule group activities because of the need for multiple people to coordinate their times, especially in their busy lives. They also acknowledged that while fewer than half of the participants had formed exercise groups via digital health devices, three-quarters of them had heard of such activities. They felt that if digital health activities became more widespread, it would be easier to exercise with people from different locations, and more people could join based on their availability. They also believed that if digital health support expanded, it could be particularly helpful for people in regions with limited access to medical resources or exercise opportunities.

Sports like tennis require a certain number of people, and it's hard to match schedules in today's busy society. Additionally, location can be an issue, especially when it's rainy or during the monsoon season. I think digital health would be beneficial because it removes location constraints and makes gathering groups easier. (Participant 13)

With digital health technology, even if people aren't in the same region, if they have similar interests and goals, they can

form groups. I've heard that people are even meeting up for clubs via Zoom these days. (Participant 15)

Discussion

This study aimed to explore the perceptions of young adults in their 30 s regarding digital health technology for promoting exercise. In their thirties, participants noticed changes in general beauty standards and their own physical decline, prompting awareness of the need for exercise. While they recognized the benefits of regular exercise, they emphasized the need for exercise partners to stay motivated. They saw digital devices as useful for tracking and information, but also as often too complex and only providing short-term enjoyment.

The first major finding concerns how the participants' perceptions of health changed as they transitioned into their 30 s. Participants' narratives revealed that physical decline and shifting beauty ideals prompted a reevaluation of health priorities—indicating a transition from appearance-driven to health-oriented motivation for exercise. This aligns with previous research which suggested that as individuals move from adolescence into young adulthood, they assume new roles and responsibilities, often leading them to reduce health-risk behaviors.²⁷ The 30 s are characterized as a period of “established adulthood,” during which individuals often face competing demands such as work–family conflicts.²⁸ While emerging adulthood (ages 18–30) is marked by a social media-driven focus on body image,²⁹ established adulthood tends to involve a rapid decline in health and increased stress because of various life circumstances.²⁸ In fact, more than half of Korean men in their 30 s are classified as obese,³⁰ and the prevalence of diabetes is rising rapidly in this age group.⁴ Interpreted through the lens of self-determination theory (SDT), these findings suggest that participants increasingly valued autonomy and well-being over external validation, reflecting a shift toward more intrinsic motivation for engaging in exercise.³¹ Their changing health values appeared to emerge from the interplay between internal experiences (e.g., perceived bodily changes) and external realities (e.g., heightened health risks), suggesting that the 30 s may represent a critical window for health behavior interventions.

The second key finding concerns the participants' perceptions of exercise. Participants reported engaging in exercise because of its perceived physical, emotional, and economic benefits, while simultaneously experiencing real-world constraints. This finding is consistent with research which indicated that while direct benefits such as an improved physique and better health serve as motivators for exercise, maintaining exercise is hindered by factors like lack of time, financial limitations, and environmental constraints.³² According to the Health Belief Model, perceived benefits and perceived barriers both play critical roles in determining whether health behaviors are

sustained.³³ Thus, participants were likely to engage in exercise when they believed the benefits outweighed the barriers. In this regard, digital health technologies may offer considerable potential by mitigating the temporal and spatial limitations that inhibit exercise.³⁴

However, the participants emphasized that interpersonal interactions during exercise in real-world settings were more important than digital technology. Although digital health technologies can facilitate online social networking, studies have shown that such networks do not fully substitute for in-person connections, which many people find more meaningful.^{35,36} Digital technologies are generally valued for providing low-risk opportunities for social participation and broadening social reach.³⁷ Nevertheless, online relationships—characterized by anonymity and lack of face-to-face interaction—are often perceived as less trustworthy,³⁸ easier to disengage from,³⁹ and unable to fully substitute for in-person relationships,⁴⁰ with some evidence even suggesting detrimental effects on mental health.⁴¹ From the perspective of SDT, fulfilling basic psychological needs such as relatedness can enhance autonomous motivation, promote high-quality performance, and contribute to overall well-being.³¹ Taken together, these insights highlight the importance of designing digital exercise programs that actively facilitate interpersonal interaction and rapport-building among users. As highlighted in qualitative studies targeting young people in the Global North, sustaining engagement with digital health devices may require actively integrating digital health technologies with social media, influencers, and micro-celebrities, as well as promoting them through visual media such as memes and platforms like Snapchat and TikTok.⁴²

The third key finding relates to the participants' experiences with digital health technologies. While many participants expressed interest in using health devices with advanced technologies, they reported that such technologies had only short-term effects on promoting exercise and were often cumbersome, leading to discontinued use. These findings confirm research that identified digital health literacy, technology accessibility, and usability as key barriers to the adoption of digital health tools.⁴³ Although digital health technologies are recognized for their advantages and potential, their effectiveness remains unclear and demands further research.^{37,44} To develop more effective digital health interventions, research should focus on improving digital health affinity and enhancing patient engagement.

Lastly, many of the participants were optimistic about digital health technologies. While they generally acknowledged the usefulness of these tools, several suggestions for improvement were made. The participants noted the need for more tangible and specific benefits, such as personalized feedback and reduced costs. Additionally, they believed that digital health tools would be more effective if they facilitated the participation of a diverse group through online networking. These insights align with the

existing literature on challenges and future directions for digital health technology development.^{45,46} Studies have shown that patient engagement improves health outcomes,^{47,48} and various strategies—such as fostering social support,⁴⁹ gamification elements like challenges,^{14,49,50} and the use of diverse media^{50,51}—have been explored. However, the effects of digital health interventions remain generally limited, necessitating further investigation.

The findings of this study suggest that digital health technologies have the potential to improve population health and promote health equity. For adults in their 30s—those in the stage of established adulthood—these technologies may serve as effective tools for encouraging exercise by addressing time and space limitations. However, to maximize their effectiveness, interventions must be more attuned to users' needs for emotional connection, sustained motivation, and social engagement. Addressing the limitations of digital technologies—particularly the lack of emotional interaction—is essential. Ultimately, well-designed strategies that foster patient engagement and ensure the continuity of health behaviors are crucial.

Future research should focus on developing tailored digital health interventions that more precisely reflect the life context and motivational factors of adults in their 30 s. Beyond mere technological solutions, it is essential to foster social bonding and emotional interaction to support sustained participation and long-term health behavior change. From a policy and practice perspective, nurses and healthcare professionals could design hybrid interventions that combine digital monitoring with periodic in-person coaching or group-based gamification elements. For example, mobile health coaching apps could be used to deliver tailored feedback between sessions, while in-person meetings provide social support and accountability—addressing participants' expressed need for both technological convenience and human connection. Such efforts can help promote exercise and improve overall health outcomes, contributing to the broader goal of reducing health disparities among this population.

Strengths and limitations of the study

This study has several limitations. First, the participants were recruited through snowball sampling, which may have resulted in a sample biased toward individuals with greater interest and enthusiasm for digital technology and more inclination to actively engage with it. Second, data were collected through a single time-point interview without follow-up or repeated interviews, limiting the ability to capture participants' evolving perspectives or contextual changes over time. Consequently, potential changes in perceptions of digital health technologies over time may not have been reflected in this study. Furthermore, this study employed a qualitative study design targeting adults in their 30 s in Korea. Participants were initially recruited through

university bulletin boards and subsequently via snowball sampling. Most participants were office workers, and this occupational homogeneity may have influenced their perceptions and experiences; moreover, socioeconomic diversity was limited. Consequently, the sample was skewed toward highly educated individuals in professional positions, which limits the generalizability of the findings.

Despite these limitations, this study is significant in that it explores the perceptions of adults in their 30 s regarding digital health technologies for exercise. This demographic has been relatively overlooked in research even though they use digital health tools frequently. Importantly, the study captured rich data from 24 participants, reflecting the unique and realistic life contexts and life-stage characteristics of individuals in established adulthood. In addition, diversity in both gender and age (early, mid, and late 30 s) was well represented. These findings offer practical guidance for developing targeted health interventions tailored to adults in their 30 s.

Conclusion

This study explored the perceptions of adults in their 30 s regarding the use of digital health technologies for exercise. The findings suggest that during this life stage, individuals increasingly prioritize health-oriented motivation over appearance-driven goals while navigating real-world constraints such as limited time, stress, and competing responsibilities.

Digital health technologies hold promise for promoting exercise by mitigating these temporal and spatial limitations. However, their effectiveness appears to be enhanced when interventions foster social interaction, emotional connection, and sustained engagement, rather than relying solely on technology. Integrating online tools with in-person coaching, gamification elements, and personalized feedback may address both technological convenience and the need for human connection.

Future interventions should be tailored to the life context and motivational dynamics of adults in their 30 s, integrating technological solutions with opportunities for social bonding and accountability. Such strategies have the potential to enhance exercise participation, improve overall health outcomes, and contribute to reducing health disparities in this population.

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Ethical approval

The Institutional Review Board of the author's university approved this study (1041078-20240322-HR-052). This study adheres to the principles of the Helsinki Declaration (2008), ensuring participants' privacy and confidentiality.

Consent to participate

The participants provided informed consent and were informed of their right to decline participation or withdraw consent at any time. Prior to the interviews, the participants received both oral and written explanations of the study's purpose, which was conducted as part of a researcher's thesis and a broader research project. Written informed consent was obtained from all participants before the initiation. Participation was voluntary, with written consent secured. Anonymity and the right to withdraw were guaranteed. Direct quotations from interviews are presented without identifying the participant. Interview recordings and data were securely stored offline on password-protected external drives with access restricted to researchers directly involved in the study.

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Use of AI

The authors disclose that Grammarly software was used for language editing. All scientific content, analyses, and interpretations were conducted by the authors themselves. The authors carefully reviewed and edited the manuscript and take full responsibility for the final version of this manuscript.

Supplemental material

Supplemental material for this article is available online.

References

1. Bull FC, Al-Ansari SS, Biddle S, et al. World health organization 2020 guidelines on physical activity and sedentary behaviour. *Br J Sports Med* 2020; 54: 1451–1462.
2. Boyer WR, Churilla JR, Ehrlich SF, et al. Protective role of physical activity on type 2 diabetes: analysis of effect modification by race–ethnicity: 体力活动对 2 型糖尿病的保护作用: 根据人种-种族修正的效果分析. *J Diabetes* 2018; 10: 166–178.
3. Ministry of Health and Welfare, & Korea Health Promotion Institute. *Physical activity guidelines for Koreans. Revised edition.* 2023 https://www.mohw.go.kr/board.es?mid=a10411010100&bid=0019&act=view&list_no=1479208&tag=&nPage=1.
4. Korea Disease Control and Prevention Agency. *Korea Health Statistics.* 2022: Korea national health and nutrition examination survey (KNHANES ix-1). Accessed May 31, 2025.
5. Jeon YW and Kim HCJKCJ. Factors associated with awareness, treatment, and control rate of hypertension among Korean young adults aged 30–49 years. *Korean Circ J* 2020; 50: 1077–1091.
6. Inoue K, Kondo N, Sato K, et al. Trends in cardiovascular risk factors by income among Japanese adults aged 30–49 years from 2017 to 2020: a nationwide longitudinal cohort study. *Endocr Pract* 2023; 29: 185–192.
7. Liao Y and Brown KK. Usage of digital health tools and perception of mHealth intervention for physical activity and sleep in black women. *Int J Environ Res Public Health* 2022; 19: 1557.
8. Iyawa GE, Herselman M and Botha A. Digital health innovation ecosystems: from systematic literature review to conceptual framework. *Procedia Comput Sci* 2016; 100: 244–252.
9. Saleh ZT, Elshatarat RA, Elhefnawy KA, et al. Effect of a home-based mobile health app intervention on physical activity levels in patients with heart failure: a randomized controlled trial. *J Cardiovasc Nurs* 2023; 38: 128–139.
10. Wang W, Cheng J, Song W, et al. The effectiveness of wearable devices as physical activity interventions for preventing and treating obesity in children and adolescents: systematic review and meta-analysis. *JMU* 2022; 10: e32435.
11. Oh YJ, Zhang J, Fang M-L, et al. A systematic review of artificial intelligence chatbots for promoting physical activity, healthy diet, and weight loss. *Int J Behav Nutr Phys Act* 2021; 18: 60.
12. Yang L, Díaz VG and Kumar PM. Internet of things-based intelligent physical support framework using future internet of things. *Technol Health Care* 2021; 29: 1187–1199.
13. Mazeas A, Duclos M, Pereira B, et al. Evaluating the effectiveness of gamification on physical activity: systematic review and meta-analysis of randomized controlled trials. *J Med Internet Res* 2022; 24: e26779.
14. Nor NN, Sunar MS and Kapi AY. A review of gamification in virtual reality (VR) sport. *EAI Endorsed Trans Creat Technol* 2020; 6: 1–8.
15. Jakob R, Harperink S, Rudolf AM, et al. Factors influencing adherence to mHealth apps for prevention or management of

- noncommunicable diseases: systematic review. *J Med Int Res* 2022; 24: e35371.
16. Zeadally S and Bello O. Harnessing the power of internet of things based connectivity to improve healthcare. *Internet of Things* 2021; 14: 100074.
 17. Borghare PT, Methwani DA and Pathade AG. A comprehensive review on harnessing wearable technology for enhanced depression treatment. *Cureus* 2024; 16: e66173.
 18. Aggarwal A, Tam CC, Wu D, et al. Artificial intelligence-based chatbots for promoting health behavioral changes: systematic review. *J Med Internet Res* 2023; 25: e40789.
 19. Eldredge LKB, Markham CM, Ruiter RA, et al. *Planning health promotion programs: an intervention mapping approach*. 4th ed. Hoboken, NJ: John Wiley & Sons, 2016.
 20. Arlettaz ME and Ramos G. Socioeconomic inequities and barriers to physical activity in Argentina. *Prev Med* 2023; 173: 107555.
 21. Silva AOD, Diniz PRB, Santos MEP, et al. Health self-perception and its association with physical activity and nutritional status in adolescents. *J Pediatr* 2019; 95: 458–465.
 22. Park S-K, Tomita S, Kim D-S, et al. The effect of virtual reality-based physical activity therapy program on physical fitness factors in adult-systematic reviews. *The Journal of Korean Society of Rural Planning* 2022; 28: 33–40.
 23. Ilić P, Katanic B, Hadzovic M, et al. Barriers to physical activity (PA) in the working population: a review. *Sport Mont* 2024; 22: 129–136.
 24. Statistics Korea. *Population trends survey*. Statistics Korea. Retrieved October 13, 2025, from <https://www.index.go.kr/unity/potal/indicator/IndexInfo.do?cdNo=2&clasCd=10&idxCd=F0032>. 2024.
 25. Braun V and Clarke VJQ. Using thematic analysis in psychology. *Qual Res Psychol* 2006; 3: 77–101.
 26. Lincoln YS and Guba EG. Criteria for assessing naturalistic inquiries as reports. 1998.
 27. Ames ME, Leadbeater BJ and MacDonald SWS. Health behavior changes in adolescence and young adulthood: implications for cardiometabolic risk. *Health Psychol* 2018; 37: 103–113.
 28. Mehta CM, Arnett JJ, Palmer CG, et al. Established adulthood: a new conception of ages 30 to 45. *Am Psychol* 2020; 75: 540–553.
 29. Rounsefell K, Gibson S, McLean S, et al. Social media, body image and food choices in healthy young adults: a mixed methods systematic review. *Nutr Diet* 2020; 77: 19–40.
 30. Korea Centers for Disease Control and Prevention. *Korea national health and nutrition examination survey fact sheet*. Cheonju; 2020.
 31. Deci EL, Olafsen AH and Ryan RM. Self-determination theory in work organizations: the state of a science. *Annu Rev Organ Psychol Organ Behav* 2017; 4: 19–43.
 32. Garcia L, Mendonça G, Benedetti TRB, et al. Barriers and facilitators of domain-specific physical activity: a systematic review of reviews. *BMC Public Health* 2022; 22: 1964.
 33. Janz NK and Becker MH. The health belief model: a decade later. *Health Educ Q* 1984; 11: 1–47.
 34. Abernethy A, Adams L, Barrett M, et al. The promise of digital health: Then, now, and the future. *NAM Perspect* 2022; 2022: 1–24.
 35. Marinucci M, Pancani L, Aureli N, et al. Online social connections as surrogates of face-to-face interactions: a longitudinal study under COVID-19 isolation. *Comput Hum Behav* 2022; 128: 107102.
 36. Scott RA, Stuart J and Barber BL. Connecting with close friends online: a qualitative analysis of young adults' perceptions of online and offline social interactions with friends. *Comput Hum Behav Rep* 2022; 7: 100217.
 37. Toh G, Pearce E, Vines J, et al. Digital interventions for subjective and objective social isolation among individuals with mental health conditions: a scoping review. *BMC Psychiatry* 2022; 22: 31.
 38. Paul CD, Thomas EV, Doulin AM, et al. Using wireless technology to support social connectedness in individuals with intellectual and developmental disabilities: a focus group study. *J Spec Educ Technol* 2022; 37: 276–285.
 39. Nesi J, Choukas-Bradley S and Prinstein MJ. Transformation of adolescent peer relations in the social media context: part 1-A theoretical framework and application to dyadic peer relationships. *Clin Child Fam Psychol Rev* 2018; 21: 267–294.
 40. Stieger S, Lewetz D and Willinger D. Face-to-face more important than digital communication for mental health during the pandemic. *Sci Rep* 2023; 13: 8022.
 41. Aliverdi F, Farajidana H, Tourzani ZM, et al. Social networks and internet emotional relationships on mental health and quality of life in students: structural equation modelling. *BMC Psychiatry* 2022; 22: 51.
 42. Lupton D. Young people's use of digital health technologies in the global north: narrative review. *J Med Internet Res* 2021; 23: e18286.
 43. Palacholla RS, Fischer N, Coleman A, et al. Provider- and patient-related barriers to and facilitators of digital health technology adoption for hypertension management: scoping review. *JMIR Cardio* 2019; 3: e11951.
 44. Stevens S, Gallagher S, Andrews T, et al. The effectiveness of digital health technologies for patients with diabetes mellitus: a systematic review. *Front Clin Diabetes Healthc* 2022; 3: 936752.
 45. Guo C, Ashrafian H, Ghafur S, et al. Challenges for the evaluation of digital health solutions—A call for innovative evidence generation approaches. *NPJ Digit Med* 2020; 3: 10.
 46. Leuzzi G, Recenti F, Giardulli B, et al. Exploring digital health: a qualitative study on adults' experiences with health apps and wearables. *Int J Qual Stud Health Well Being* 2025; 20: 2447096.
 47. Fortmann AL, Gallo LC, Garcia MI, et al. Dulce digital: an mHealth SMS-based intervention improves glycemic control in hispanics with type 2 diabetes. *Diabetes Care* 2017; 40: 1349–1355.

48. Quinn CC, Butler EC, Swasey KK, et al. Mobile diabetes intervention study of patient engagement and impact on blood glucose: mixed methods analysis. *JMU* 2018; 6: 31.
49. Block G, Azar KM, Romanelli RJ, et al. Diabetes prevention and weight loss with a fully automated behavioral intervention by email, web, and mobile phone: a randomized controlled trial among persons with prediabetes [web]. *J Med Int Res* 2015; 17: e240.
50. Fukuoka Y, Gay CL, Joiner KL, et al. A novel diabetes prevention intervention using a mobile app: a randomized controlled trial with overweight adults at risk. *Am J Prev Med* 2015; 49: 223–237.
51. Foltynski P, Ladyzynski P, Pankowska E, et al. Efficacy of automatic bolus calculator with automatic speech recognition in patients with type 1 diabetes: a randomized cross-over trial. *J Diabetes* 2018; 10: 600–608.