

# Workout Motivation Through Technology-Mediated Training

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Exercise plays an increasingly critical role in many lives, even for those who are avoiding it. Technology has become an increasingly important component in nearly every aspect of life. However, there are significant gaps in how technology can improve critical aspects of one's exercise, especially in motivation. This study aims to answer how these technology-mediated training (TMT) programs affect users' sense of motivation both during and after their workout. Using interviews from people who utilized one specific exercise class from a well-reviewed training app, this study aims to determine the specific aspects that make people tend towards online training and increase their likelihood of utilizing it more. The theory we developed posits that people are motivated to use TMT because of convenience and flexibility, environmental control, progress tracking with positive reinforcement, and knowledgeable trainers. We have observed that users report feeling a higher sense of motivation to apps that incorporate all of these aspects in their training. As a result, users push to improve workout performance and consider incorporating these exercises into their lifestyle.

CCS Concepts: • **Human-centered computing** → *HCI theory, concepts and models*; **User studies**.

Additional Key Words and Phrases: motivation, technology-mediated, workout, training

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## 1 INTRODUCTION

In a world where every aspect of life is beginning to incorporate technology, it is natural to see how these advancements affect a person's motivation to exercise. As of 2017, 42.2% of Americans suffered from obesity, and that induces a large amount of possibly fatal illnesses in those people [7]. Exercise can extend these people's lives, but it is challenging to maintain a fit lifestyle without an excess of time and money. Studying the technology everyone already has to motivate them to exercise is essential because it can show people a pathway to a healthy life. This study examines how technology-motivated training (TMT) can generate and affect a person's motivation to exercise. By determining the factors that increase motivation, design suggestions are made to create the optimum exercise experience for the user and increase the chances of that user continuing an exercise program.

Given that advances in technology have become readily available to the general public, it stands to reason that there are resources to help people exercise more or eat healthier. Studies evaluating general human technology interaction have gone into how people can work with the technology that is readily available to most to motivate towards a healthier lifestyle. A study [21] into the effectiveness of integrating technology to encourage healthy practices found that every technology evaluated had merit in helping people make healthier decisions. They evaluated tools such as apps, social media, video games, progress trackers, and internet intervention, ultimately finding that these tools had significant value in helping people become more active and eat healthier. This study evaluates the beneficial relationship

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between humans and technology in fitness. However, there have not been any evaluations of TMT specifically. The field of physical training involves incredibly personal bonds and very interactive encouragement. The study conducted in this case will evaluate an app that focuses on mediating online recorded training. Looking at this specific aspect will allow insight into if the very personal practice of physical training can be effective in an app.

While thousands of apps facilitate exercise for the user, very few incorporate TMT, and even less do so effectively. In order to determine what sparks motivation in a user to exercise with these programs, this study aimed to determine the factors that created an optimal user experience and effectively motivated the user. Once these factors were determined, it would be relatively simple for any company, government entity, or other group to incorporate them into their technology-mediated training program to create healthier communities. Nearly every person has room for improvement in their health and activity levels, so wide accessibility will increase the number of users who try them. If they are properly motivated, they will become repeat users. Understanding how to motivate people into exercise using TMT will be one of the most potent tools apps have in motivating people to work towards healthier lifestyles. We asked: "How does technology-mediated training generate and affect motivation during a workout?"

The field of Human-Computer Interaction (HCI) has the opportunity to understand the complex relationship between people and their technology in terms of their health. As life expectancy rises, people and medical research is shifting more towards improving the quality of life lived. One of the most prominent aspects of improving that quality is maintaining a healthy lifestyle, so using different technologies to promote that lifestyle has increased in popularity. HCI can integrate itself in health and wellness research because technology is becoming a more critical tool in being healthy. Step counters, calorie trackers, video games, and social media are all examples of technologies evaluated in terms of HCI and healthy lifestyles. By doing this, the field would be able to establish itself in the growing health industry and make discoveries that could help people optimize their efforts in healthy eating or exercise. By acknowledging the value in enhancing HCI in terms of exercise, various companies, including the one utilized in this study, have built successful businesses. The reward in researching this aspect of HCI is vast and expanding, so further dedication to evaluating subjects like TMT will prove invaluable to the field.

## 2 RELATED WORKS

This section explores the literature about fitness motivation, technology, and health.

### 2.1 Technology and Health

In 2009, the US government launched the American Recovery and Reinvestment Act (ARRA), a stimulus plan addressing almost every facet of the US economy. [2] One of the most prominent areas targeted by ARRA is healthcare; especially a subset of it officially called health information technology (HIT).

"The HIT components of the stimulus package—collectively labeled HITECH in the law—reflect a shared conviction among the fledgling Obama administration, the Congress, and many health care experts that electronic information systems are essential to improving the health and health care of Americans." [1]

With an allocated budget of \$27 Billion [3], the HITECH Act is a testament to the growing importance of health technology in our societies.

The use of technology in health care and health support has indeed become ubiquitous. From explorations of the effectiveness of various technology-based health interventions delivered to health care consumers using public platforms such as MEDLINE, Global Health, Web of Science, or again UK NHS HTA [6] to works exploring areas such as privacy

[19], simulation for practitioners [8] or again the universal condition of ageing [10]. The area of technology for health is as varied as there are ailments and conditions. However, in the context of our exploration, we are aiming to focus on technology addressing everyday physical health.

### 2.1.1 *Technology and Physical Health.*

A 2015 National Survey Study [24] by Wartella et al. - displaying how teens use digital technologies (mobile apps, electronic gaming, wearable devices, social media) to explore health topics - revealed that 29% of their studies teens with mobile access had downloaded a health-related app. Among which thematic apps, fitness, and nutrition-related apps led the way with, respectively, 23% and 14% of downloads).

Already, in 2011, among the 1056 official "Healthcare and Fitness" apps on the Apple App Store, about 37% were classified as fitness apps or tracking apps[15]; these shifts in trends were already echoed, back then, by a 2010 Pew Research Center report indicating that the internet and technology in general, were becoming the bedrock upon which healthcare was to be redefined. Indeed, the report by Lenhart et al. [12], estimated that "31% of youth ages 12–17 report looking up fitness-related information online, a slight increase from 28% in 2006". Furthermore, this number appeared even higher for the adults, with 38% of over 18-year-olds reporting the same behavior.

All these elements make it so that we believe an exploration of fitness motivation, as both instantiator and mitigator of the modern workout experience, is crucial to developing any accurate technology-mediated training app.

## 2.2 **Fitness Motivation**

Much of the work on personal informatics in fitness motivation has been carried out either in the pure theoretical framework or in technological feature design. This work leaves a gap in the user-focused research we are conducting.

### 2.2.1 *Fitness Motivation, a General Overview.*

Saksono et al. [20] in their 2020 study exploring fitness apps aimed at resolving child obesity in low-socioeconomic status families in the Boston area concluded that *satisfying moments* constituted great motivators for fitness habits continuation. These moments were social rewards, such as new chapters unlocked for a selected bedtime story that the whole family could look forward to after accomplishing a specific fitness goal. Beyond social aspects, the fitness motivation literature seems to heavily lean towards the individual, notably with studies such as Thorgesen et al.'s [23] exploration of High-Intensity Intermittent Training (HIT) and Moderate Intensity Continuous Training (MICT) concluded that self-determined motivation, especially intrinsic motivation, constituted the key factor in follow-through rates. These findings echo earlier studies from 2012 [22]. These findings are especially impactful knowing that research has proven that fewer fit individuals may be less likely to adhere to fitness programs [11] which can hint at the necessity for a sense of self-efficacy in fitness motivation.

### 2.2.2 *Relevant HCI Theories.*

From a theoretical point of view, several theories stand out. For instance, the goal content theory and the self-determination theory (SDT) [4, 5]. While these explore the motivations behind the actual choice of working out (before a workout), they fail to account for the motivations during a workout. These theories, in a nutshell, convey ideas akin to: ... different people are motivated towards an action (i.e., exercising) by desires to reach different goals and that the goals may be either intrinsically or extrinsically motivated [16].

Despite the gap, there is clear relevance to our research. For instance, in terms of extrinsic motivation, a participant mentioned they "felt like they were on the same level as everyone else and that they weren't below anybody. "An

example of intrinsic motivation would be: "I always think what would happen if I get older. If I don't work out now. If I don't work these simple steps, I will not be able to do simple tasks when I get older."

While exploring these questions, our study focuses primarily on what users perceive as the affordances given to them by the technology. The theory of affordances describes a relational dynamic between user goals and technological features; [14] postulates that the concept of affordances is "that objects have properties; and animals that make use of objects have their own physical characteristics and a host of needs." Most information technologists adhering to this theory posit that people's goals shape the affordances they find in technology features [13, 17].

The validity of this theory and its implications were made clear within our interview responses (i.e., the convenience of features such as trainer guidance and verbal feedback). Additionally, the most significant indication of its validity was given us when users let us know that the original Nike Run App's feature design largely failed to provide the fundamental affordances of assisting in working out (i.e., the vocal assistance was distracting, the pacing was odd).

### 2.2.3 Feature Engineering.

From a feature engineering perspective, in a 2020 study [9] aiming to determine the reasons and motivations behind using a fitness app: 28% of respondents cited convenience, 26% mentioned ease of engagement, 24% mentioned privacy, while 24% mentioned lower price when compared to a traditional gym environment. Another study by Molina and Sundar [18], titled "Can Mobile Apps Motivate Fitness Tracking: A Study of Technological Affordances and Workout Behaviors", examined workout regiment maintenance through fitness apps. It also analyzed fitness app usage for 682 profiles and extrapolated the features necessary for motivation based on users' feedback.

## 3 METHODS

We used the Peloton app to assist our theory development study and specified a 20-minute beginner workout. As mentioned above, the Nike Run Club app was used initially but later discarded for technical limitations. We chose the Peloton app because of its affordances in playing music, tracking feedback, and training all into one platform. It thus allowed for the testing of multiple possible contributors to motivation simultaneously. Furthermore, as a fairly popular app, we knew that it had gone through extensive user testing so that we would not run the risk of technical issues influencing our participants' perceptions.

### 3.1 Participants and Recruitment

Using a flyer distributed in different school departments, Fike Recreation Center and Clemson University's Reddit page, and convenience sampling, we recruited fourteen (14) individuals for an interview. We completed eleven (11) interviews using the Peloton app. Two (2) additional interviews were conducted with participants using a different application, the Nike Run Club app. After feedback about the underperformance of the app both in design and in workout format, we decided to switch to the Peloton app to improve the interviewees' experience. Our participants included Clemson students between the ages of 21 and 31; through convenience sampling, two of our participants were adult non-Clemson students. We had ten female and three male participants.

### 3.2 Data Collection Process

With a total time commitment of approximately 50 minutes per interview, the interview process was conducted as follows:

### 3.2.1 Introduction:

For each participant, we began with an introduction of the study, which consisted of a brief overview of the motivations beyond this study. We then asked the participants if they had any questions concerning the study, not in content but format.

### 3.2.2 Pre-Workout Interview:

Approximately the first 15 minutes of the study consisted of conducting the pre-interview with questions developed around three (3) main areas of interest:

#### Workout habits:

These were used to determine the baseline of the participant. Examples include:

- What, if you have any, are your habitual workout routines?
- Recall, if you can, a moment where you worked out with others. Describe it.
- How, if at all, do you listen to music, use a workout app, or use some sort of fitness tracker (Apple Watch, FitBit, etc.)

#### Workout motivation:

These explored the participants' motivation experience during a workout. For instance:

- Describe examples of motivations for you to workout.
- What do you think could motivate you more to work? Examples? Why?

#### Workout experience:

These questions explored users' general experience with their workouts. The elements they like and dislike and also what they perceive as potential room for improvement.

- How, if at all, do you think your workout experience can be enhanced?
- What aspects of working out do you enjoy the most?

### 3.2.3 Work-Out:

This second phase of the study lasts 20 minutes, which constitutes the length of the pre-selected class.

### 3.2.4 Post-workout interview:

The third part of this study, constituting a 15 minutes post-workout interview, was designed to give us insight into the experience the participants went through and what reflections it brought them to compared to their previous experiences. The main focus was:

#### Baseline comparison:

These questions included elements such as:

- How was your experience compared to a normal workout? Please explain
- Compared to traditional workouts, do you feel more motivated to work out? Why or why not?

#### Choice, preferences, affordances exploration:

These questions were designed to help us explore the user's preferences; it is worth noting that most users answered these before even being asked as they naturally find suggestions to give and shortcomings to point out. These questions include:

- Would you consider the app as a viable alternative to your normal way of training? Given adjustments to tailor to your preferred form of working out.

- What do you think could motivate you more to work? Examples? Why?

### 3.3 Memoing Process and Grounded Theory Formation

We have analyzed the transcripts exploring the sentiment type, the theme, and the categorization. As we looked at the highest occurring themes, our theory developed across definite categories for motivation emergence and relationships among them.

**3.3.1 Coding.** In our initial coding, we sifted through the interview data looking for expressions of sentiment indicating perceived motivation. We looked for unambiguously positive and negative sentiment expressions, as shown in Figure 1.

Unknown Speaker 6:03  
And how do you feel when you when you do your walks?

Unknown Speaker 6:09  
Good. I feel I feel tired. When it seems like a lot of stress goes out with those steps. I'm sure like also, it's like when you when you don't use your phone. Usually just work and hear the sound of nature. It's also gives you a relaxing feeling. And I believe that it helps me focus more when I go back to work. But the problem is with the phone again, it's like I keep going and going with the phone. And every time I see the social media platforms, this just ruins the experience.

Unknown Speaker 7:08  
So from what I gather, what you enjoy the most is just that connection and that relaxation.

Fig. 1. Initial Coding Example: Positive green and Negative red Sentiments

We also identified sentiments which we refer to as *adjacent positive*. These do not necessarily address the direct question of motivation while using the app, but they may indicate a need that the user had but could not conceive of its fulfillment through an app like this one. Figure 2 depicts this very well.

Unknown Speaker 18:19  
Yes, I always thought about having a personal trainer, but that's you know, because the religious thing. I don't, I cannot go to the gym, where men and women are were men around us. So I think this is kind of give you privacy that you can do. You can have your own personal trainer at home.

Fig. 2. Initial Coding Example: Adjacent Positive Sentiment

Adjacent negative sentiments depict similar emotions, however they suggested feelings against technology mediated workout as opposed to non-technology mediated workouts in Figure 3.

Figure 4 gives an example of elements we identified as future projections; these are sentiments that revolve around the participants' anticipated reasons for working out. This category also involved statements such as "I didn't know if he would have different technique for more difficult workouts" or "I don't know if this is something like this in the market," which indicate participant intent to pursue the app mediated workout activities were design elements to be added to the app itself.

Unknown Speaker 16:08

Yeah. To be honest, because it's only 20 minutes. Okay, I always do that I always do more than that. So it's okay to have for 20 minutes. The idea is that with the running, I don't usually when I have asthma, and so I get tired so quickly. But with this gradual experience that you you, you work for, like you have to warm up and then walk for a minute and one for two minutes. And he said he always said was running to relax during running. So I like this. Too much. Nice. Yeah, I need it.

Unknown Speaker 16:51

Fig. 3. Initial Coding Example: Adjacent Negative Sentiment

Unknown Speaker 9:13

I always think what would what would happen if I get older if I don't work out now if I don't work these simple steps will not be able to do simple tasks when I get older.

Fig. 4. Initial Coding Example: Future Projection

### 3.3.2 Theoretical Sampling.

As we kept going through our initial coding, rough categories started to emerge around a preference for fitness apps due to control and hints of convenience. However, the categories needed refinement; for instance, statements that alluded to user engagement, such as "it was like I have my own personal gym," could have had a direct source either from the app itself or the trainer as we later came to see. As we did subsequent interviews, gradual theoretical sampling allowed us to refine these categories and establish that there are two distinct dimensions of user engagement in this particular study: relative to the trainer and relative to the affordances of the technology itself.

### 3.3.3 Categorization and Memo Writing.

The subsequent generated code was compiled on an Excel sheet as the categories we are going to be exploring below started to emerge. Figure 5 depicts the category emergence process.

Subject	Stage	Sentiment Type	Phrase	Pre-Code	Code	Theme	Discussion (Comments)
3	Post-workout	Positive	First of all, I have three things that I like about this app and this workout.	N/A			#organizedEnthusiasm; we're here for it
3	Post-workout	Positive	The coach is really good. I like the way he speaks to us all the time.	Coach appeal			"Us" identification with other people who use the app
3	Post-workout	Positive	tried to motivate us and give small tips.	Guidance			"Us" identification with other people who use the app
3	Post-workout	Positive	I feel like he's an expert, so he knows what he's doing	Expertise			
3	Post-workout	Positive	really like the music in the background, I really do				
3	Post-workout	Negative	When you're you're walking in the gym or something and you're not putting anything or you're not listening to music, you get bored after like three minutes or something.	Music to mitigate boredom			
3	Post-workout	Positive	the music, yeah, so you're like it, and you can	Music as catalyst to continue			
3	Post-workout	Negative	round music with his instructions, too.	Background music			
3	Post-workout	Neutral	rogram is as well, like there is a warm up and	Progression / Eased into the process			
3	Post-workout	Other(Clarified in Discussion)	run with not the full speed. So you feel like they're doing in this workout.	Progression / Eased into the process			
3	Post-workout	Other(Clarified in Discussion)	It's not just let's go and run for like 20 minutes or something.				Eased into process

Fig. 5. Initial Coding Example: Sentiment Assessment



Lastly, in order to make the report of our findings richer, we selected quotes which were particularly potent when it comes to fitness motivation while using the app. Figure 6 shows some of these excerpts.

<b>Gems:</b>	
<b>Subject 1</b>	The idea is that with the running, I don't usually because I have asthma, and so I get tired so quickly. But with this gradual experience, like you have to warm up and then walk for a minute and run for two minutes. And he said he always said was running to relax during running. So I like this. Too much. Nice. Yeah, I need it.
	you don't feel of something like that. You get you get the good side, the motivation without the bad or the negative effects.
	they want a motivational person but not a judgmental one. So this kind of AB works for it.

Fig. 6. Initial Coding Example: Quote Selection

## 4 FINDINGS

### 4.1 Convenience and Flexibility

Convenience and flexibility allow participants to fine-tune their workouts and their experience with the technology. It allows them to keep it within their comfort zone and branch out when they want to. This convenience factor is critical for users' motivation because it allows them to work out on their own time, in their own home or any other location, and at their own pace. One participant stated, "you didn't have to schedule a time for it, whenever you feel like you can have it done." This flexibility allows them to work out when they have that motivation and helps them build a routine off of it.

### 4.2 User Control

User control is about controlling their environment and different forms of external stimuli. Their environment consisted of the location and other people in the area. Participants stated issues about having trouble finding people to work out with or wanting to work out totally by themselves. Using a technology-mediated trainer allowed the participants who wanted a group to feel like they had someone and the participants who wanted to be by themselves to go to an isolated place while still having a trainer with them. This level of control further helped participants be comfortable during their workout and not have any stress or anxiety hinder their motivation. We had some participants who required this



level of control due to medical issues or religious convictions. With user control, these participants could work within their boundaries and act on their motivation to exercise.

### 4.3 User's Perception of Themselves

Some of our participants found issues with working out due to a negative perception of themselves. This perception negatively affected their motivation to work out. One participant stated, "people don't like to work out with me because I am too slow." They then said that the technology allowed them to work at their own pace without anyone pressuring them or feeling like a burden to the others they were working out with. Another participant said, "you get the good side, the motivation without the bad or negative effects." Another common negative perception experienced by users in traditional workout settings but not in TMT settings was the feeling of inadequacy brought on by seeing others perform workouts at a higher fitness level than possible by the subject. TMT allowed users to work out without seeing others more fit or athletic work out at a higher level than them. The use of technology allowed users to work out and experience these negative perceptions at a lower rate and avoid situations that could make them anxious, nervous, or uncomfortable. These comments show that the control they have allows them to work out comfortably and experience these positive situations even though they do have these negative feelings.

### 4.4 Trainer to User Engagement

Having a knowledgeable trainer allows the participants not to focus on their form or pace and allows them to stay engaged with the trainer's encouragement. By not focusing on these other things, they could either distract themselves from being tired or stay focused on keeping going. Participants engaged in things they wanted to be helped them stay motivated. Participants also specifically desired a knowledgeable trainer over a purely motivational trainer. Participants showed distaste towards TMT trainers who had a predominately "ra-ra" attitude (a very motivational "You've got this!" attitude). Participants were much more likely to prefer a trainer who provided a mix of encouragement and technical ques.

### 4.5 Technology to User Engagement

Different aspects of the technology kept the participants engaged in different ways. Some participants find motivation and satisfaction in seeing their progress. They liked the visual and numeric representation of their progress on a broad scale (across multiple workouts) and a narrow scale (in each workout). Being able to gamify their workout in some way provides positive reinforcement and keeps participants wanting to continue, and keeps their motivation up.

## 5 DISCUSSION

### 5.1 Theory

Our theory currently is

"People are best motivated by technology-mediated training that affords them convenience and flexibility, environmental control, progress tracking with positive reinforcement, and knowledgeable trainers."

The goal of incorporating any trainer in one's workout routine is to help one reach their goals. TMT is no different, but should also provide a more positive and motivating experience for the user. Users find that the four following aspects should be incorporated in TMT:

- Greater convenience and flexibility in usage when compared to traditional trainers,

- Better environmental control when compared to traditional trainers,
- Progress tracking with useful and positive reinforcement,
- And effective, knowledgeable, non-intrusive trainers.

Of note is the ability to control better their environment where they work out when they use TMT. Being able to, for example, carry a smartphone with a good training app will allow the user to work out wherever and whenever they would like. This flexibility allows the user to have complete control over their environment and choice of stimuli; this study demonstrates that this increases the likelihood of working out and persevering. Users can have a great workout experience without any external limitations preventing them from doing so. The user can improve their workout routines while considering their pre-existing lifestyle and lack of external pressure.

A user must have at least a minimum amount of intrinsic motivation to begin using TMT. Beyond that, the TMT should provide extrinsic motivation to help push the user to reach forward and towards their goals. As stated previously, different people are motivated towards different goals with different methods and different motivation levels [16]. As such, the flexibility of TMT for each use case is vital to its usefulness. Being able to afford the user the previously mentioned four aspects builds toward the flexibility of TMT.

When considering the aspects that TMT should incorporate to provide an excellent experience for the end-user, several critical design implications arise in building a good platform. First and foremost, this theoretical platform should be more convenient and offer greater flexibility for the end-user than a traditional workout trainer. Frequently, this platform could be a smartphone application (app), which would afford most of the ease required. The app could limit the requirement of streaming workout sessions to prevent a user from being tethered to a constant WiFi connection or limited cellular bandwidth; perhaps the ability to pre-download a session would prove helpful.

In order to provide environmental control beyond the fact of a platform hosted on a smartphone app, the platform should allow users to tailor their trainer to work in their preferred environment. The app could let users select a workout appropriate to their environment, such as separate sections for indoor gym or outdoor trail usage. The ability to toggle in-app music off and on would allow users to choose whether to listen to their music. Permitting the user to select a difficulty for their trainer sessions would allow them to work out at their own pace, set realistic goals, and otherwise avoid being outside their comfort zone.

A theoretical platform should also provide tracking paired with valuable and positive reinforcement. According to some of our study participants, the Peloton app was an excellent example of this. The app provided audio cues to the user that informed them about their progress during their 20-minute run and audio reinforcement to help encourage the user. Making the user feel like someone was present and helping significantly improve their experience; a new platform should do the same.

Finally, the trainer from within a TMT platform should demonstrate apparent expertise in training without being distracting. The guidance and information from the platform should be legitimate and valuable to the user or at least appear to be. Without this user-to-platform trust, the user may not be emotionally or physically invested in the platform. To this extent, the platform should have a modern and clean design, from audio to visual; an unprofessional appearance suggests unprofessional service. The platform should also establish itself with, for example, per-class/session user reviews, a recommendation system, or instructor introductions. Additionally, informative advice builds further trust from the user.

## 5.2 Categories

Five different motivational categories/methods were discovered in this study. These categories were:

- (1) Convenience and flexibility,
- (2) User control,
- (3) User's perception of themselves,
- (4) Trainer to user interaction,
- (5) And technology to user interaction.

The first category, convenience and flexibility, was the most obvious. Colloquially convenience and flexibility is likely the most common reason for starting any form of TMT.

The second category, user control, can be very different for users. One user may wish to work out in a public park with many people, another may wish to work out in their basement, and another may wish to work out in the woods. Regardless of user choice of location, the overall theme of control was very prevalent. This category may also be necessary for some people. This study had a subject who would not work out in many traditional gym environments due to religious convictions. TMT allowed them a way to work out without compromising their religious beliefs.

The third category was users' perception of themselves. Most commonly, this category refers to a general desire for a judge-free workout experience. Many subjects commented that TMT allowed them to feel they were working out without feeling judged or seeing other gym goers in better shape performing better than them, leaving them feeling inadequate. This feeling of judgment or inadequacy significantly lessens people's motivation to continue to work out. A more niche feeling was also discovered concerning this category: some users felt themselves a burden to others due to being in worse shape.

The fourth category was trainer to user interaction. This category primarily revolves around how TMT trainers interact with their trainees. Many users showed a distaste for a purely motivational trainer to trainee interaction. This one-sidedness was the most significant pitfall of the Nike Run Club app. The TMT trainer on this specific app was found to have a "ra-ra" attitude that most users found demeaning and demotivating. The Peloton app had much more success with its TMT trainer. Peloton's TMT trainer focused less on a "ra-ra" attitude and more on technical ques. This more professional attitude was much more effective at motivating users.

The final category was technology to user interaction. This category deals with how the user interacts with the literal programming of the TMT application. Most importantly, users desired some gamification component to the TMT experience. Users wanted to compete against others or gain some in-app reward from the TMT application. TMT seems to be a great alternative to traditional methods of working out. In fact, TMT allows people who would otherwise be unable to or desire not to work out an opportunity to train.

## 5.3 Comparison with Literature

Findings from our study support previous literature claims that technology can and should support physical health. Continued practical usage of a TMT platform can positively improve the user's well-being. A poor experience can limit or prohibit the ability of the platform to be helpful, while an excellent experience suggests the building of healthy habits.

This study fills in the gaps left by some previous studies. The motivation of users was seen to be increased during the workout if the previously mentioned guidelines were followed. Results also suggest that motivation between workout

sessions can increase if the user feels invested or connected to the app. Some reasons found in other studies for fitness app usage are also observed in our study, like the convenience and strict scheduling.

## 6 LIMITATIONS

This study has a few opportunities for further study. They mainly have to do with the short time spent with interviewees. There are aspects of technology-mediated training that could not be effectively incorporated into the study due to the focus on one short workout. Namely, most gamification aspects of many technology-mediated training apps require users to invest more effort and time than was available in this study. Many apps have weekly/monthly contests that interviewees could not participate in during the span of our study. These gamification methods would likely be a reliable source of motivation for interviewees if they could participate in them. Some interviewees commented that they had either noticed and regretted not participating in these contests or desired some competitive aspect in the study. A more robust study would have interviewees participate for more extended periods, allowing closer inspection of these motivational tools.

Another opportunity for further study is the general demographics of our interviewees. This study was conducted in a college town with primarily in-person interviews. While it was unintentional, our interviewees were, in general, and for the most part, young and healthy. This focus is likely because the studies focused on in-person interviews, which caused the study to use the people inside the college. While the study did include some virtual interviews, these interviewees were also coincidentally generally young and healthy. Further study on older age groups and generally unhealthy people is possible. While this study remains an excellent resource for insight on technology-mediated fitness motivation, motivation may be achieved differently among different age demographics. Further study could provide more insight.

Another study could investigate different levels of workout difficulty. This study focused on normalizing our interviewees' experience, where interviewees interacted with the app in a controlled manner. To be more specific, all interviewees were trained with the same app and the same specific workout class on that app. This limit was an attempt to create a normalized experience that the interviewers were familiar with to understand interviewees' responses better. However, to be inclusive, the workout chosen for interviewees to participate in was a beginner workout. This ease could have affected the interviewees' motivation. If interviewees did not feel challenged, they might have become apathetic and unmotivated. Interviewees of higher fitness caliber may have come away less motivated than others. A further study could be conducted to investigate this aspect of our study. Perhaps that study would be designed to allow participants some choice of workout. Perhaps interviewers could compile a list of approved workouts that came in varying difficulty categories. This list would allow participants to tailor towards their perceived fitness level while providing data that better encompasses the vast skill differences in users.

## 7 CONCLUSION

In order to better understand how technology impacts fitness in our daily lives, this study aimed at observing how fitness-based technology impacts a user's perceived motivation. Subjects used two apps that implemented TMT methods for research on how the subjects interacted with TMT applications and what aspects of TMT applications help to motivate users. The first app, Nike Run Club, proved to implement TMT motivational methods much worse than the second app, Peloton. Both the failure and the success of both apps helped to illuminate proper TMT design and what methods and techniques are critical to creating a motivational TMT experience.

As the world becomes more technologically advanced, it is not unreasonable to expect traditional training to decline and TMT to rise. By understanding how users of these apps are motivated, people can increase their motivation and, as a result, increase the general health and happiness of their communities. This study provides TMT application developers with a foundation to create successful TMT applications by implementing five general categories.

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