

D1 Understanding the Problem

CS-PSYC 6755 / HCI Foundations

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01 The Users

Spurred on by the significant disruption in our lives, schedules, and relationships caused by the pandemic, our team has decided to investigate how we might improve the experience of **working adults ages 25-34 looking to exercise in their home spaces with friends who are not physically present in that physical space**. We believe this is an impactful problem to explore in relation to **well-being** because recent events have disrupted people's socialization by shutting down gyms [8]; whilst, we see higher application of video conferencing tools in professional work and personal communications. Thus, we identify potential in this problem space as users are increasingly finding innovative ways to use digital technology and adapt. Such as, working out together with their regular gym partners, friends, and/or families, using online workout videos with video conferencing tools. Hence, we decided to delve into this area with an eagerness to uncover more insights through research, and design innovative solutions within our problem space.

1.1 User Group Characteristics

1.1.1 Demographics

Our target user group is young adults, 25-34 years old, and employed full-time. Additionally, we target users who need support to develop / maintain a more regular exercise routine but have had intermediate experience (1-2 years) in exercising.

1.1.2 Exercise Needs

Exercise exhibits numerous benefits for physical and mental health. Regular physical activity is known to help prevent chronic diseases such as cardiovascular disease, obesity, and cancer, as well as mental disorders such as anxiety and depression [14]. However, only 53.3% of the U.S. adult population meets the recommended exercise guideline, that is, at least 30 minutes of moderate-intensity aerobic physical activity per day [18,19]. We anticipate helping facilitate exercises such as body weight circuit workouts using home everyday equipment.

1.1.3 Busy Schedule due to Work and Family Responsibilities

Full-time working adults have schedules that vary largely, which imposes constraints on their leisure time. Some jobs may require frequent travels, while others allocate unconventional hours. In addition to work schedule, users may need to cope with many personal tasks, such as family and/or parental responsibilities. Thus, it is no surprise that a key pain point for full-time working adults is their time constraints that impede them from maintaining an exercise routine. In fact, many people report giving up exercising due to "lack to energy" or "insufficient effort" [10].

1.1.4 Other Barriers

Furthermore, studies have shown that other high barriers to working out include lack of access to exercise facilities, as well as the lack of enjoyment of exercise. Thus, we are keen to further explore the ways we can utilize digital solutions to overcome these significant factors that impact the health, fitness, and wellbeing of users [10].

1.1.5 Long-distance and Different Time Zones

Our target users live geographically apart from their close friends due to various circumstances including work-related mobility. Studies have demonstrated that close social networks not only provide vital emotional support in day-to-day experiences but are also crucial to cope with new experiences during life transitions [11]. Communication media is instrumental in reducing the effect of geographic distance [9]. Hence, there is opportunity to also enhance social wellbeing of long-distance friendships.

1.1.6 Intrinsic and Extrinsic Motivations

Psychologically, our users likely rely on intrinsic and extrinsic motivations to successfully maintain regular physical activity [6]. According to *Self Determination Theory* [3], intrinsic motivation is driven by three fundamental psychological needs: *competence*, *relatedness*, and *autonomy*. In the context of exercise, *competence* relates to one's belief in successfully performing physical activity, and potentially mastering new skills or challenges. *Relatedness* corresponds to social aspects including a sense of shared experience and building relationships with others through participation. *Autonomy* manifests in one's freedom to select exercises based on interest [20]. In addition, a distinct intrinsic motivating factor for younger adults (our target users) is enjoyment, with an emphasis on "having fun" [7].

Extrinsic motives for exercising include appearance, fitness (to feel/be healthy), and opportunities for social interactions [20]. Among these, fitness and social motives are likely to play an important role in helping users maintain an exercise routine.

1.1.7 Proficiency with Technology

Most Americans have access to digital devices. According to a Pew Research Center survey from 2019, 99% of U.S. adults in the 25-34 age group own a cell phone, and more than 93% of our target user group own a smartphone [13]. In addition, about 75% of the adult population own laptop or desktop computers, whereas approximately 52% own tablets [13]. These statistics suggest that technology intervention on personal digital devices may be effective in promoting health-related social behaviors and facilitating/ supporting an engaging group exercise experience.

02 User Goals

2.1 Socialize & workout with existing friends

Individuals are more likely to join or stay motivated when their friends are participating in the same exercise[14]. However, the benefits of having a companion for exercise goes beyond motivation. Research suggests that exercising with others changes one's mood and energy levels[14]. From our exploratory interviews, a few interviewees reflected that they tend to push themselves harder when working out with friends. This phenomenon can be explained by the social comparison theory [4], which in the exercise context, fosters both a sense of healthy competition and a positive social influence to engage people around them in health-promoting behaviors.

2.2 Form consistent routine with the help of others

Exercise partners can provide tremendous emotional support [21]. According to our interviewees, small moments such as high-fives at the end of an intense workout felt extremely rewarding. From a psychosocial perspective, exercising with others imposes accountability on all participants [12], leading to an increased level of commitment, which in turn helps participants develop a consistent routine.

2.3 Have a sense of undergoing the same workout at the same time

Our exploratory interviews indicated that one aspect absent in current existing systems is the sense of satisfaction drawn from completing a workout together. While leaderboards and gamification can lead to users competing against one another asynchronously, ultimately the aspect of cooperation to overcome an obstacle is missing. Our system should aim to replicate that sensation of cooperative satisfaction despite the users being in separate places. Creating an experience where users feel as though they completed a workout together could potentially contribute to users exercising consistently, as well as bring users closer together as companions.

03 Task Analysis

3.1 Characteristics of the Task

3.1.1 Is synchronous

The simultaneous nature of our task has many implications. Firstly, given our user profile, exercising together requires either scheduling between two or more parties or spontaneous linking up. Secondly, our task involves several people, possibly of varied ability, performing potentially difficult

exercises together. Expecting participants to always be in perfect sync is unrealistic.

3.1.2 Involves potentially harmful activities

Exercising can be a dangerous activity. The inescapable reality of exercise is that one will always be manipulating their body in such a way that they or their surroundings may become injured. This can happen through negligence (e.g. attempting a pull-up on a bar that is not properly secured) or overconfidence (e.g. persisting with a heavy lift despite feeling significant pain).

3.1.3 Involves an intersection of socialization and exercise

There are positive and negative aspects to exercising in a social context. While there is evidence to suggest that exercising with friends can improve the consistency[17] and intensity[14] of one's workout, socializing may also be a detriment to exercise, distracting people with conversation rather than exercise. Of course, the goal of this project is well-being, not strictly exercise, so some tradeoff can be acceptable.

3.2 Characteristics of the Task Environment

3.2.1 Set in highly variable exercise spaces

The living arrangements among young adults have become increasingly diverse and complex. According to 2015 census data, there are three major living arrangements for young adults in the 25-to-34 age group: living in their parents' house, living independently with a spouse or unmarried partner, and living with roommates (relatives or non-relatives) [1]. With each living situation, 43.6%, 63.9%, and 55.5% of the age group are working full-time, respectively [1]. Since we're focusing on exercises catered to the home space, understanding different home dynamics give us insights into the environmental constraints such as access to equipment, and the social factors of exercising in a shared domestic space.

3.2.2 User may not be able to handle or see device

Unlike the standard operating procedure of personal devices, the user likely will not be able to hold onto their device while exercising, so they may need to give commands and receive hands-free and potentially non-visual feedback.

3.2.3 Involves delicate devices to potentially be put in harm's way

Exercise does not just pose a potential threat to people's bodies; it can pose a threat to everything around them. Given that an internet-enabled device will be essential in our design, this device will very likely be put in danger. The user could hit or step on the device if careless or the device

could fall if placed in a precarious position.

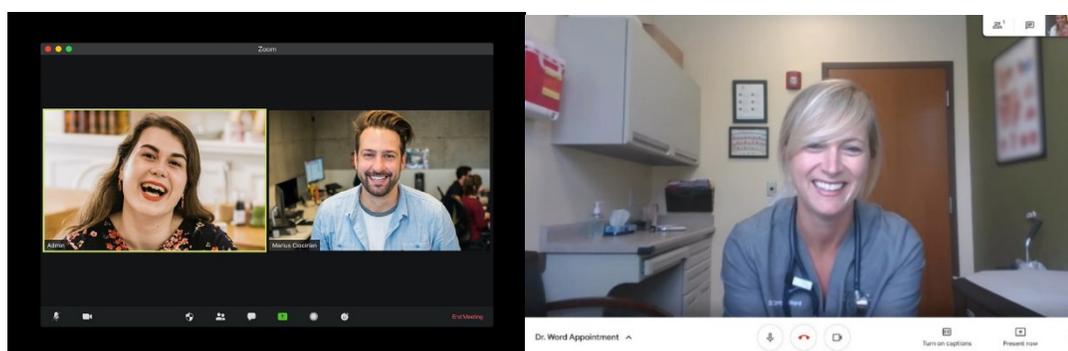
3.2.4 Relies on a connection to the internet

Interacting with other people over long distance will require internet connectivity. Internet quality and reliability vary significantly across households. Our system should account for both: accommodating users with limited internet while being robust to disconnections. Wi-Fi dead zones may also restrict the placement of a device to inconvenient areas.

04 Analysis of Legacy / Existing Systems

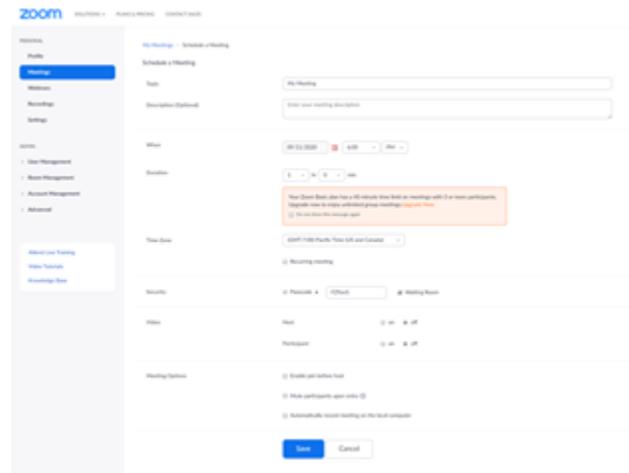
4.1 Video Conferencing Software (*Zoom / Blue Jeans / Teams / Google Meet*)

One of Video conferencing software are services designed to allow users to make video calls over the internet. Due to the pandemic, these services have seen a massive increase in their userbase, so an immediate benefit of these services is user familiarity [22]. Many people will be generally familiar with video conferencing interfaces and will likely be aware of their common practices and quirks.



LEFT Zoom's interface. RIGHT Google Meet's interface

Of course, none of these apps were specifically designed for group exercise, so their designs do not anticipate any of its contextual requirements. However, in both interviews we conducted, users indicated that they made use of Zoom to conduct their remote group exercise sessions. The users gave us the impression that these apps were somewhat jerry-rigged to work in the exercise space. They noted the awkwardness of setting up Zoom on their devices, setting up their devices safely in the room, and troubleshooting issues at the beginning of the call. Mid-call disconnects were also disruptive to the workout, knocking people out of their flow, and requiring them to pick up the device to manipulate the small interface. However, our users also noted how convenient it was to set up meetings and send out calendar requests via the app to their partners, so they can get reminders that fit into people's schedules.

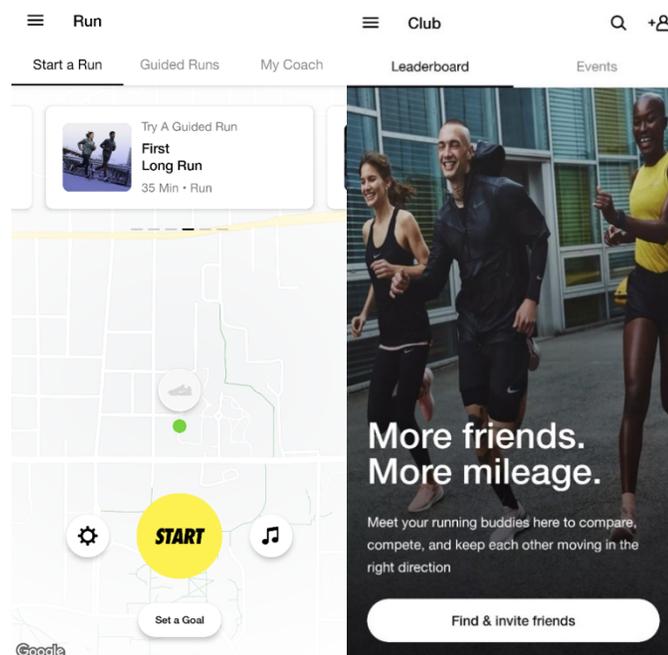


Zoom's calendar request interface

4.2 Asynchronous Methods

For individuals looking to exercise with one another but are unable to do so synchronously (either because of scheduling conflicts or time zone differences), other options exist. Several mobile applications exist that are designed to inspire the user to exercise more by allowing them to compare their progress against other users'[23,24]. The Nike+ Run Club app (produced by Nike) has over 10 million downloads on the Google Play Store[25] and is ranked #10 on the App Store[26]. The app offers a wide range of features, such as simple run tracking, customized training programs, integration with the Nike store (personalized results based on user runs) and enabling users to compare their scores globally using leaderboards, and locally with their contacts. Users can also share runs with their friends after completing them, as well as employ in-app features to keep themselves engaged such as customized playlists, in-run audio encouragement from friends and famous athletes. The app offers flexibility in letting users work out when they want to, while keeping tabs on how their friends are performing. However, the app also has some shortcomings.

While users can compare their progress with one another, ultimately, they exercise alone, and compare results afterwards. Thus, the sense of mutual experience is absent, and it feels like two people exercised independently, rather than exercising together. Additionally, there can be discrepancies in duration and intensities of the workout session. Lastly, on a more technical note, some users report that battery consumption increases dramatically while the application is recording an exercise session.



LEFT The simplistic initial interface for Nike Run Club. *RIGHT* The "Club" functionality for Nike Run Club

4.3 Gamification (*Zombies, Run!, Couchto5K*)

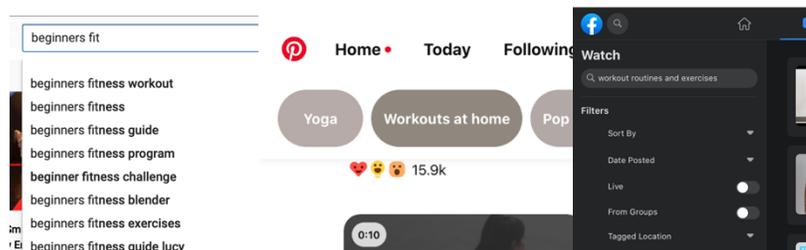
Existing gamified systems are receiving positive feedback from users, many with above 4.5 ratings with more than 10K user ratings [Appendix A]. The main strengths of these systems include mobile accessibility where users can connect to their devices e.g. smartphone, smartwatches, anywhere they are (with Wi-Fi/data connection) to utilize the training program [8]. Next, these systems highly leverage on gamification as the main element of motivation or training; some use engaging fictional storytelling [27] while some use virtual trainers or curated playlists [27] to encourage the users during training. Also, these apps offer flexibility to users as they can customize their workout intensity level such as running pace, or alternate between running/walking as they build their strength; this accommodation will be less intimidating to beginners and help them stick to their exercise [2].

The downsides of these services include the need for Wi-Fi/data connection to work effectively, as well as headphones / earphones. Also, they do not own built-in functions for synchronous exercises with other users; although they have online/external communities or forums, the workouts are ultimately done alone on the digital platform. Lastly, there is no one to correct their postures or methods in real time if users are not doing the activity right.

4.4 Curated / Pre-recorded exercise videos (*YouTube / Pinterest / Facebook*)

These new-age platforms have revolutionized the availability of fitness information to the

public. They are free to sign up (low cost) which lowers the barrier to entry for many users especially beginners/users who are not ready or able to invest a lot of money into training programs. Also, they are often easy to access and search, with few touchpoints and simplified filters to sort for desired videos [Appendix B].



YouTube, Pinterest, & Facebook are easy to access with simple filters

Another key benefit is their mobility where users can access them anytime, anywhere with the proper devices and internet connection. Next, these platforms are not short of variety and choices for users to explore and choose for their personal needs and goals [15]. Moreover, self-conscious users love the ability to work out in the privacy of their own spaces without the fear of being judged by others in gyms / classes [5].

Some deficiencies include the lack of synced virtual workouts with other users without using third party video conferencing tools. Another key issue is the lack of verification and reliability of the content; these training programs are not verified by any overseeing body but must be consumed at the users' best judgment. Users are also not able to know if they are following the programs right, as no one is there to correct / guide them in real time. Although these platforms boast a plethora of choices, they can become overwhelming to some users and may lead to a paradox of choice [28]. Many of these platform users also find it hard to stay consistent and motivated as they are self-learning at their own pace and may not have a rigid structure or schedule to adhere to [16]. Finally, some platforms have many touchpoints that lead to dead ends such as incomplete workout videos that link users to sign up for expensive training programs (catch and bait) [Appendix B].

4.5 Live Streaming/Synchronous Channels

Fitness studios and trainers are utilizing a variety of online conferencing, social media, and video platforms to live stream free workout classes. The platforms include, but are not limited to, Zoom, IGTV, TikTok, Facebook, and YouTube [Appendix C]. Most workouts are catered to home or office space; they either utilize available resources such as furniture or do not require any equipment.

This form of synchronous virtual workout offers a few notable benefits. Firstly, the sessions are

more interactive, where trainers may potentially offer personalized fitness advice. Secondly, it provides a sense of community and accountability, which alleviates social isolation and contributes to both mental and physical health. Additionally, it provides a structured experience and the motivation to adhere to a routine.

However, a few shortcomings may arise from this system. For one, participating in live sessions requires stable Wi-Fi connection, which may cause inconveniences at times. Although most instructors try to host workout sessions outside of work hours, some people may encounter conflicts due to unexpected tasks on a short notice. Others may even find waking up early in the morning or exercising after a regular workday to be tiring. Finally, one may eventually have to subscribe to membership to access more advanced classes or continue participating in a training series.

05 Analysis of Context

5.1 Sociocultural Context

As compared to older adults, younger adults have increased difficulty completing exercise programs, citing multiple barriers including insufficient effort, negative physical effects, and social barriers, as well as family responsibilities and career commitments [7]. Thus, solutions looking to encourage young adults to exercise should try to do so on a consistent basis. This can be accomplished by removing barriers such as cost and lack of equipment, as well as increasing social support [9]. Aside from age and gender, socioeconomic constraints also exist. According to Microsoft, approximately 47% of Americans do not access the internet at lower-than-broadband speeds (which they define as 25 Mbps)[29]. Thus, constructed solutions will need to be limited in bandwidth usage.

5.2 Physical Context

Bodyweight fitness requires very little by means of equipment [30]. Thus, the physical environment can vary. However, it can be assumed that the user is not going to be in unusually demanding environments while exercising and expected that the user will be moving around their space. Additionally, as the solution will be present when the user is exercising, sweat/moisture should be expected.

06 Description & Justification of Research

We utilized a range of research methods to gain diverse understanding and guide our future research, design methods, and solution thinking. Firstly, we leveraged scientific journals and papers e.g.

Annals of Behavioral Medicine and *American Journal of Preventive Medicine* from online research databases; we used these resources as they are peer-reviewed, trustable, and considered reliable sources. Next, we scheduled and ran several user interviews to further understand granular details and nuances in their experiences; this method helped us empathize with our target users, whilst uncovering details that other methods fail to reveal. Additionally, the team carried out extensive website searches from science blogs, to nutritional and fitness forums, we scoured the web to place ourselves in the shoes of users and identify the resources easily accessible to our target users. Finally, we utilized market and consumer reports to delve into the current trends; this gave us a broad overview of the landscape, identify market gaps, current UX issues and understand detailed user behaviors.

07 Design Implications

Given our research and assessments, we summarized the implications they have upon the design of our system below:

Design Assessments	Information Source	Design Implications
Group exercise requires schedule coordination	User interviews, personal experience	Feature that allows for some degree of scheduling and planning e.g. input availabilities
Exercises often require syncing difficult motions between users	User interviews, personal experience	Design might include feature that helps users align their movements to sync with their workout p
Exercise can be harmful to one's own body	User interviews, literature review, personal experience	Our design shouldn't cause the user to be more negligent or overconfident than normal. Deeper research may be required to determine how to avoid this.
Exercise can be harmful to one's environment	User interviews, assumption	Design should accommodate for the physical space that users are accustomed to
Exercise is fatiguing	Personal experience	Design should be simple enough that even physically exhausted users can still use it. The interface should ideally be robust to imprecise, trembling limbs and people out of breath
People's work out spaces are variable	Assumption	Design should accommodate for the physical space that users are accustomed to
Most people in our user group own a mobile device	Literature review	Design would be interactive to mobile / tablet / desktop conventional screen resolutions and sizes
Synchronous remote interaction requires an internet connection	Assumption	Design would work most effectively online with some form of internet connection
Internet connections can be unreliable	Personal experience	Potential to explore limited features offline; requires further research into this matter
Exercising may prevent direct interfacing with devices	Assumption	Design should allow for wide range of movement involved with exercise; this includes, but not limited to

		volume and video / screen sizes on the interface
Exercising may put devices in harm's way	Assumption	Design should ideate ways where devices need not be in the way of users' exercise
Many users already have experience with synchronous social networking apps	User interviews, literature review, personal experience	Our design should not clash with people's existing perceptions of how these systems work
Users do not want the flow of their exercise to be hindered	User interviews	Design should be robust to internet disconnections, have minimal notifications / alerts (if any are needed), and allow interfacing with minimal interruption to exercise

08 Panel Summary

We held our project panel session on Wednesday, September 2nd. Our primary focus was to understand how to break down a problem space in a concrete, meaningful way and how to keep an unbiased, open mind in terms of potential solutions.

The key question we had was “What advice do you have for limiting our scope and reducing uncertainty?” The panel suggested various methodologies e.g. using anxiety / affinity maps, which can highlight user concerns. The panel also emphasized discarding existing assumptions which led into our next question: “How should we approach designing a solution that isn't just a re-hash of solutions we think were unsuccessful?” They pointed out the importance of understanding *why* people are not using a specific technology, and *why* they have a preference of one technology over another. Innovation does not necessarily come from an interface nobody has thought of but can also come from a better-fitting user context. There was also concern about existing solutions causing us to bias the pool of solutions we could come up with. To that, we were told that re-referencing our competitive analysis and understanding the strengths and weaknesses of existing solutions would help break us out of a mental block. Figuring out how systems distinguished themselves from one another is important, and even more important is to ignore the medium by which solutions are provided. Focusing on what features our solution provides can make it seem less entrenched in a specific medium.

Regarding our current project status, we have been doing preliminary research (literature review, existing systems, user groups, etc.), preliminary interviews. We conducted a group interview with people who are currently participating in remote workout sessions, and two additional interviews with our initially proposed target users (“working adults who cannot be in the same room, who would like to work out routinely together.”)

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10 Appendix

Appendix A

Zombies, Run! Mobile Application



Zombies, Run!
Running Game & Audio Adventure

4.8 ★★★★★
17K Ratings

#162
Health & Fitness

12+
Age

OPEN

HOW IT WORKS

Walk, jog or run anywhere in the world.



Hear your mission and music through your headphones.



If you're chased by zombies, you'll have to speed up!



You'll automatically collect supplies to build up your base.

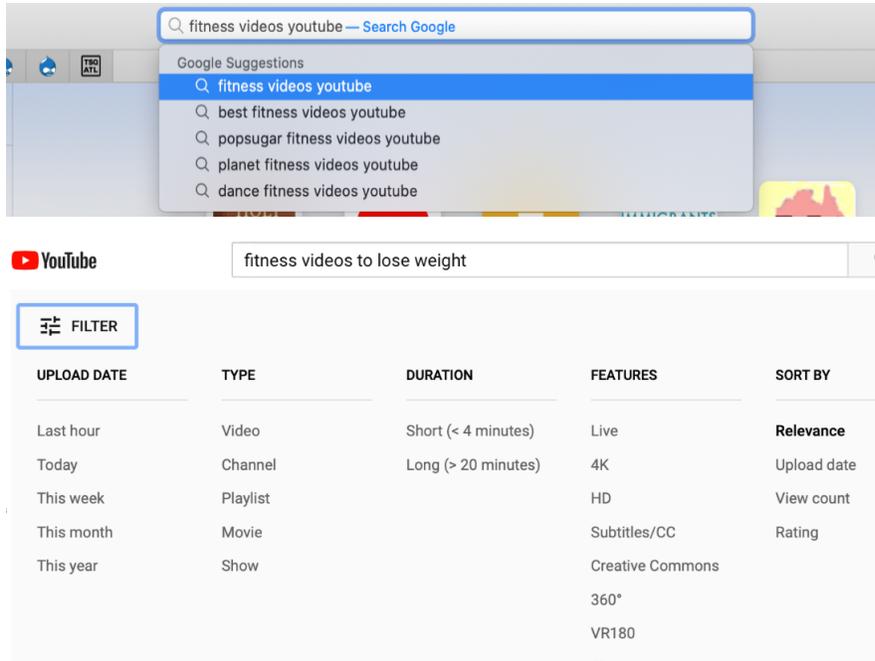


 <p>Zombie Chases. Get your heart racing.</p>	 <p>200 Missions. You'll never run out of motivation.</p>	 <p>Award-Winning Story. So good you'll want to play every day.</p>
 <p>Walk, Jog, Run. Run at every speed.</p>	 <p>Base Builder. Collect supplies to rebuild your town.</p>	 <p>Sync Online. Track your runs and share your progress.</p>
 <p>Interval Training. Create your own missions.</p>	 <p>1 Million Players. The biggest smartphone fitness game, ever.</p>	 <p>Run Everywhere. Outside, indoors, in gyms.</p>

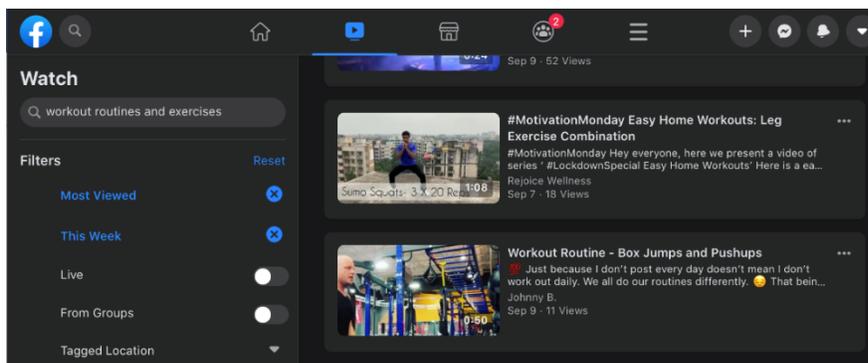
Appendix B

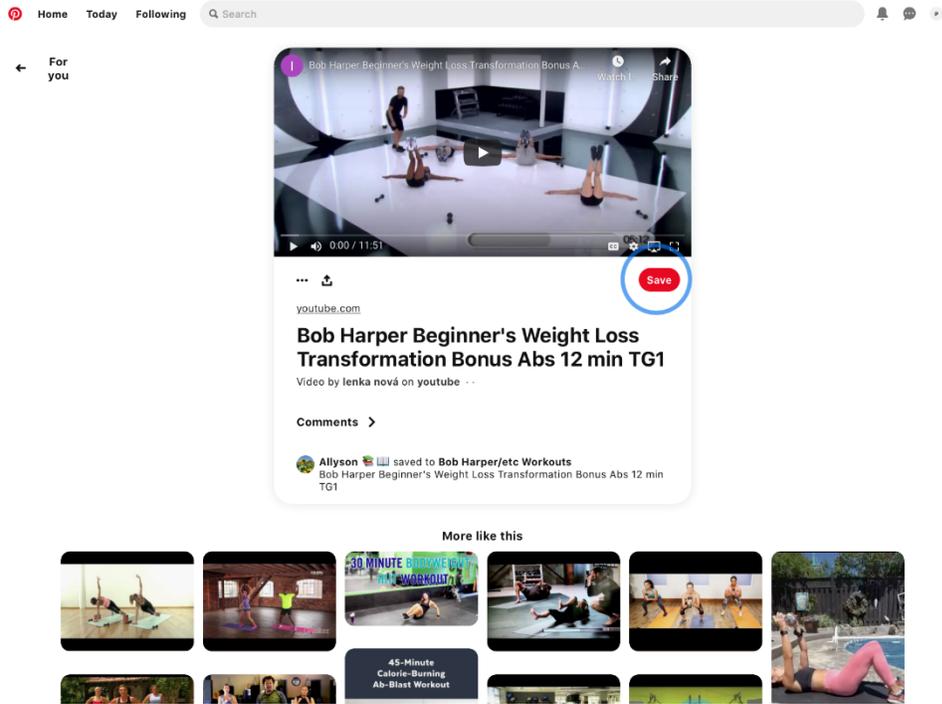
YouTube, Facebook videos, Pinterest Videos

These services have easy user access to free content, easy search, and filter features.



YouTube, Pinterest, & Facebook are easy to access with simple filters





Some Pinterest videos link to 'dead-ends' e.g. need to register for expensive exercise courses



Personal Training ▾ Online Workouts Nutrition Plans Shop ▾ Ebooks

Online Personal Coaching



Remote "Personal" Training



Online Personal Coaching

- Customized meal plan and workout program
- This plan is fully focused on YOU!
- Month to Month Plan (price drops \$20 after the initial month)
- Weekly Check Ins and Adjustments via phone call, FaceTime, text, or email
- Personal Weekly Workout Plan + Cardio
- Macro Coaching included
- Videos for each workout
- Delicious Recipes and food that YOU like
- Supplement Advice
- Once purchasing, a form will be sent to your email so I can get to know you and your needs. From there, I will be in contact with you immediately via email. Check ins will be via phone, text, skype or facetime video.

SIGN UP!

Appendix C



Instagram and IGTV Advertisements