Title of Research

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Introduction goes here (1-3 paragraphs)

Research Question: With these concepts and terminologies in mind, what exactly are the challenges that para athletes who play adaptive sports face in terms of activity and participation in their sport?

1. What is the central research problem?
2. What is the topic of study related to that problem?
3. What methods should be used to analyze the research problem?
4. Why is this important research, what is its significance, and why should someone reading the proposal care about the outcomes of the proposed study?

Background and Significance

A disability is any condition of the body or mind that makes it more difficult for the person with the condition to do certain activities and interact with the world around them. According to the World Health Organization (WHO), disability has three dimensions: 1) Impairment in a person's body structure or function, or mental functioning; examples include loss of a limb, loss of vision or memory loss; 2) Activity limitations, such as difficulty seeing, hearing, walking, or problem solving.; 3) Participation restrictions in normal daily activities, such as working, engaging in social and recreational activities, and obtaining health care and preventive services.

In 2001, the WHO published the International Classification of Functioning, Disability and Health (ICF) provides a standard language for classifying body function and structure, activity, participation levels, and conditions in the world around us that influence health (). This

description helps to assess the health, functioning, activities, and factors in the environment that either help or create barriers for people to fully participate in society. According to the ICF ():

1) Activity is the execution of a task or action by an individual.
2) Participation is a person's involvement in a life situation.

Athletes with disabilities are further classified into different classes. Depending on the class, adaptive sports may be implemented to foster inclusion and community engagement. These topics will be discussed further below.

Classes of Disabilities

Accommodation for each para athlete depends on the type of disability. The International Paralympic Committee (IPC) (n.d.) classifies people with disabilities into the following classes:

- **Impaired Muscle Power**- athletes that are unable to contract muscles to generate an adequate amount of force. This includes spinal cord injury, muscular dystrophy, post-polio syndrome, and spina bifida.
- **Impaired passive range of Movement**- athletes that are restricted or lack movement in any of their joints. Examples include arthrogryposis or contracture resulting from chronic joint immobilisation or trauma affecting a joint.
- **Limb Deficiency**- athletes that have lost part of their limb or entire limb from trauma. This could be from traumatic amputation, bone cancer, or congenital limb deficiency
- **Leg Length Difference**- athletes with different length legs from a disturbance of limb growth or trauma.
- **Hypertonia**- athletes with either increased muscle tension or hindered ability to stretch their muscles due to damage to the central nervous system. Examples include athletes with cerebral palsy, traumatic brain injury, or stroke.

- **Short stature**- athletes with reduced length of either limbs or trunk, which includes conditions such as achondroplasia, growth hormone dysfunction, and osteogenesis imperfecta.
- **Ataxia**- athletes that are uncoordinated due to a damaged central nervous system. This could be from cerebral palsy, traumatic brain injury, stroke or multiple sclerosis.
- **Athetosis**- athletes that are involuntarily and frequently slow in movement caused by cerebral palsy, traumatic brain injury, or stroke.
- **Vision Impairment**- athletes with reduced or no vision from damage to their eye or parts of the eye. For instance, athletes with retinitis pigmentosa or diabetic retinopathy would fall under this category.
- **Intellectual Impairment**- athletes that are hindered intellectually and are affected in their social and practical skills needed for everyday life. These conditions, however, must be present prior to the age of 18.

The study will focus on all types of disabilities, specifically looking at athletes and their challenges. The hope is to construct an app that will help alleviate some of the issues that they may encounter.

Importance of Adaptive Sports

Activities and participation can be made easier or more difficult as a result of environmental factors, such as technology, support and relationships, services, policies, or the beliefs of others. One example of this would be adaptive sports for people with disabilities. Adaptive sports refer to modified physical activities and athletic programs specifically designed to accommodate individuals with physical, sensory, or cognitive impairments. These sports utilize specialized equipment, rule adjustments, and inclusive frameworks to promote equitable

participation, enhance physical and psychological well-being, and foster social integration within competitive and recreational settings. For instance, paraplegic basketball, as described by the International Wheelchair Basketball Federation (n.d.), is somewhat similar but differs in the dribbling and travelling rules that are accommodated to help the wheelchair athletes move effectively. The International Paralympic Committee (IPC) has published its own standardized language and definitions in the IPC Guide to Para and IPC Terminology, in which the committee defines "para athlete" as a general term for pro and amateur athletes with disabilities who play sport but have not competed at a Paralympic Games.

Adaptive sports are important to not just paraplegic athletes themselves but also the general population as a whole because they provide those that already struggle with their disabilities an opportunity to engage with others, build confidence, improve their health, and experience the fun of sport (Bernardi et al., 2021). This sense of community is important to help paraplegic athletes' sense of belonging in society and general well being. According to Jaarsma et al. (2014), some of the facilitators for those participating in adaptive sports included fun, health, fitness, and social contacts. Overall, adaptive sports promote inclusion, challenge societal stereotypes, and help create a welcoming and safe community for disabled people to redefine themselves.

Literature Review

To understand how to best help disabled athletes, it is important to explore the many challenges that disabled athletes face and the existing solutions that are currently in place. These challenges also include limited access to proper facilities, transportation, dependence on others, and stigma in public. Additionally, the importance of exercise on the physical and mental health of disabled athletes is underscored. Current solutions include non-profit organizations,

accommodating accessibility needs, awareness, and apps. Overall, these ideas contribute to the idea that there are many extensive problems for disabled athletes face in society on a daily basis.

Challenges for Disabled Athletes

Limited Access to Facilities with Correct Equipment, Accomodation, and Accessibility

Examples of correct equipment, accommodation, and accessibility for disabled athletes include sport-specific wheelchairs, ramps, adjustable benches, transfer boards, accessible lockers, and so much more. According to Title III American with Disabilities Act (ADA), the accessibility of public facilities must be addressed. In a study by Bradley Cardinal and Marc Spaziani, they looked into how compliant physical activity facilities in Western Oregon were. (Cardinal & Spaziani, 2003) In their study, they discovered that no facility was found to be 100% ADA compliant, with the entrance and telephones being the most accessible while the actual workout equipment and customer service desk was least accessible. Through this study, it is clear that facilities are still lacking in accommodating not just disabled people but specifically the disabled athlete population, hindering them from increasing their physical activity and bettering their health.

In a separate study by Lape et al. (2019), they asked 17 participants to describe the perceived benefits, challenges/barriers, and facilitators for exercise. When asked about the barriers, participants identified barriers such as having to expend limited personal resources such as time, money, transportation. Additionally, they said it was difficult to find program information and were concerned about the equipment, wondering if they fit their safety and ability needs, accommodated their sport, and whether they guided them to seek continual experimentation and challenge. Through this study, it is very apparent that there is a deep connection between motivation and gym accessibility/quality of equipment tailored to disabled

people. These two studies show that there needs to be a reform of how accessible sports facilities are and how they need to better accommodate the disabled population to encourage them to stay healthy and feel a sense of belonging in society.

Transportation

Transportation is one of the biggest struggles for disabled athletes because they often require other people to drive them, are unable to utilize public transportation, the high costs related to adapting a car to fit their needs, and much more. Specifically, in one study by Halil Sarol (2024), he interviewed 13 wheelchair athletes and found six main themes: constraints, coping strategies, appreciation, positive feedback, need for existence, and personal development. Falling into the constraints section, Sarol (2024) reported, "Within the scope of the findings obtained, it can be concluded that the most significant constraints for wheelchair basketball players arise from structural limitations such as financial difficulties, equipment, transportation, and accommodation issues faced by clubs" (p. 9). This finding supports the claim that transportation is a major barrier towards exercise for adaptive athletes as they find it to be among the most significant limitations.

Additionally, another study by Jararsma et al. (2014) found in their study about the barriers and facilitators for those with various physical disabilities that among the notable environmental barriers were lack of facilities, transport, and difficulties with accessibility, all previously discussed as challenges. This specifically highlights how disabled people not only find challenges once they arrive but simply struggle even finding transportation to get to their gyms. Ultimately, transportation is still a major challenge for the general disabled community and disabled athletes alike as the public transit system is still not as accessible as it needs to be in all areas, accommodating a car takes lots of time and finances, and it forces disabled athletes to

feel reliant on somebody else, another challenge the disabled community commonly faces. (Elipe-Lorenzo et al., 2025).

Dependence on Others

Disabled athletes, often wanting a sense of independence and autonomy, struggle with dependence on others. This struggle causes them to feel like they are hindering someone and also makes them feel belittled as they can't function without another person. Some of the accommodations that they need help with that may cause this feeling of dependence to occur is transportation, equipment set up, funding, and more. In a previously mentioned 2025 study by Elipe-Lorenzo et al. (2025), his team looked into the many challenges that disabled people feel when playing mainstream sports. They found that structural issues such as inaccessible facilities, lack of proper training of the coaches, negative attitudes and ableist mindset, and limited access to information all attributed to the lack of participation. In this study, it shows how the structure of the gym environments and sport environments force disabled athletes to have someone help them access the facilities, utilize the equipment, and be treated fairly, all of which are simple expectations for non-disabled athletes.

Another study by Olasagasti-Ibargoien et al. (2023) focused mainly on physical activity for women with physical disabilities but also found similar ideas. The study also looks into the barriers for women with physical disabilities such as the physical, psychological, economic, social problems they must face. In the study, a total of eight types of barriers (personal, physical, psychological, direction, coach's role, economic, others' attitudes, and social support) were identified from nine studies. This highlights that women often relied on social support networks, coaches, and others' attitudes to facilitate them into the gym space because it was simply a

necessity because of the gym's accessibility, their own self-confidence, or the physical and personal challenges they may face both in and outside of sport/exercise.

Stigma in Public

Stigma in public, yet another struggle for the disabled community, roots from people's negative and discriminatory mindsets towards them because they are disabled. According to the American Psychological Association (APA, 2021), the term ableism is a "prejudice and discrimination aimed at disabled people, often with a patronizing desire to "cure" their disability and make them "normal "". In a 2025 study by Liu et al., they investigate how stigmatization in society and certain barriers that are inherent in the design of society hinder the coaching of para-athletes. They utilize a mixed-methods review of 26 studies to investigate things such as ableism, underestimation of athletic potential, insufficient funding, and lack of equipment. Public stigma includes ableist attitudes that directly affect public perceptions of disabled athletes, making it challenging for them to feel integrated into society and leaves them doubting both their athletic potential and themselves. The structural barriers such as insufficient funding and lack of equipment not only physically do not let para-athletes develop but also contributes to the previous idea of stigma, putting para-athletes in a secondary tier and ignoring their struggles. In the article, they claim that all of these are contributors that sabotage coaching effectiveness. As a result, they call for major reforms in coach education and policy implementation, focusing on improving accessibility for para-athletes.

Importance of Exercise for People with Disabilities

Physical and Mental Health

Good physical and mental health are often two characteristics that people strive for in their daily lives to maintain a good, healthy lifestyle and stay confident with themselves.

Physical health entails the body's functionality, fitness, health, and more. Mental health includes one's emotional well-being, sense of belonging in society, sense of purpose, and more. For everyone, exercise is key to maintaining this happiness and physical health. First, discussing the importance of exercise to physical health of disabled athletes, a study by Bernardi et al. (2020) looked at 68 male athletes who competed in the Paralympic Games, either winter or summer, and assessed their cardiovascular risk profile. They found that higher levels of aerobic fitness (VO2peak) are associated with lower risks of cardiovascular disease in athletes with locomotor disabilities, highlighting the importance of engaging in physical activity in protecting heart health and thus physical health.

In an investigation of the effects injury and illness has on elite para athletes' mental health, Bentzen et al. (2025) looked into 59 elite Swedish para athletes with physical, visual, and intellectual impairments. They found that athletes with injuries with illnesses that held them back from participating in sports were significantly more likely to report mental distress. This demonstrates how a shifted limit in access to sports can significantly deteriorate one's mental health even if they aren't extremely high level athletes but simply people who want to stay active and gain the many benefits of exercise.

In another study by Isidoro-Cabañas et al. (2023), they investigated the impact of adaptive sport participation on both the physical and mental health of people with physical disabilities. In their study, they discovered that disabled athletes face very unique physiological challenges and require targeted training of their composition and endurance to address these issues. However, they also found that athletes benefit significantly from emotional resilience, supportive team dynamics, and tailored motivational techniques, all of which are tactics to

improve both performance and overall well being, showcasing the impact of adaptive sports on improving physical and mental health in para athletes.

Ultimately, the importance of exercise in helping athletes strive to be their best versions, both physically and mentally is extremely important. Not only does exercise allow them to stay fit with proven effects to factors preventing cardiovascular disease, but exercise also allows athletes to develop certain traits and keeps them motivated to push past the many challenges they face in life.

Current Solutions

Nonprofit Organizations

Nonprofit organizations play a crucial role in advocating for and supporting paraplegic athletes by bringing awareness to issues such as lack of resources and helping empower disabled athletes in general. Organizations such as Ability360, Challenged Athletes Foundation (CAF), Achilles International, American Association of Adapted Sports Programs, Stride, and more all work to bring awareness to the issue and alleviate barriers.

Some organizations focus on helping their local community of disabled athletes. Ability 360, a 40+ year non profit and center for independent living in Phoenix, Arizona is run by people with disabilities and provides services for all disabled people (Ability360, 2025). For disabled athletes, they provide fitness programs, great training spaces, and foster belonging and independence. For example, they offer classes for weights, brazilian jiu-jitsu, rowing, tai-chi, yoga, and a myriad of other fitness classes.

Other larger nonprofits exist across the world to provide disabled people access to sports. Challenged Athletes Foundation (CAF) is an organization developed in 1994 that supports individuals with physical challenges that would like to get involved in sports (CAF, n.d.). They

provide financial grants, sports camps and clinics, and guidance for disabled individuals looking to get involved with sports globally.

Several organizations focus on providing adaptive sports for disabled athletes. For example, Achilles International is an adaptive running non-profit that encourages those with disabilities to transform their lives through physical activity, athletic programs, and social connection (Achilles International, 2025). In fact, they have served roughly 150,000 youth, adults, and veterans with disabilities, opened up 62 chapters across the world, and helped thousands feel more confident and good about themselves.

Other adaptive sports organizations encompass a wide range of sports and activities. American Association of Adapted Sports Programs, an organization dedicated to integrating adapted interscholastic sports, ensures that students with physical disabilities have the opportunity to participate in their school athletic programs (AAASP, n.d.). STRIDE Adaptive Sports is an organization and partner of Move United, helping wounded warfighters find adapter sports and recreation activities. Some of their programs include skiing, snowboarding, marksmanship, sled hockey, and more (STRIDE, 2025).

These are just a few of the many nonprofits in the world that address the issues that disabled athletes face. These nonprofit organizations are crucial to working towards breaking financial, social, and accessibility boundaries for disabled athletes. Whether it is improving the well-being of people, encouraging participation, helping disabled people feel a part of society, or anything else, these organizations have a clear impact on the disabled community. Nonprofits also serve to provide resources, accommodate accessibility needs, and spread awareness, all of which are crucial to supporting the disabled community.

Resources and Accommodating Accessibility Needs. Lack of resources and places lacking the proper accessibility accommodations are a common complaint for disabled athletes. For example, these needs could include facility design, lack of adapted equipment, cost for sport-specific equipment, and location. In a study by Rimmer et al. (2017), 227 fitness facilities in 10 states were assessed by the professional evaluators using the Accessibility Instrument Measuring Fitness and Recreation Environments (AIMFREE) tool. In their tests, they discovered a discrepancy in the ratings of facilities made before and after the passing of the American with Disabilities Act (ADA), finding an improvement in accessibility from the facilities created after the ADA was passed. Their study shows that a subtle improvement has been made, but it also demonstrates how there is still a need for more widespread action to reach a greater level of accessibility. In making these adjustments, disabled athletes can feel more integrated in society and improve their physical and mental health through exercise.

In another study, Sá et al. (2012) sent out a questionnaire in Portugal, to users of Rehabilitation Centres and Physiotherapy Clinics in the greater metropolitan area of Porto, the second largest city in the country. The results found that only 8% of people had adapted sports available locally and only 21% participated in sport at all despite many participants recognizing sport as fun, healthy, and a method of social integration (Sá et al., 2012). The main reasons for this was the lack of adapted facilities, highlighting how there is a clear need for more accessible facilities across the globe. In accommodating accessibility needs of the disabled population, society can help create a more inclusive and welcoming environment for disabled athletes to keep themselves in shape, feel a part of society, and create opportunities for them.

Awareness. One of the key aspects of helping paraplegic athletes improve themselves is to build a sense of awareness of how to help, what not to do, the different types of disabilities,

and much more. Awareness begins with teaching everybody how to interact with paraplegic athletes as to not harm them or belittle them in any way. In a study by Monden et al. (2021), 225 paraplegic athletes filled out a questionnaire about social stigma, and data showed that stigma led to increased depression symptoms, perceived disability, injustice appraisals, and participation. On the other hand, stigma also led to decreased quality of life and self efficacy. These results show how important awareness is to helping paraplegic and disabled athletes live happily and feel a sense of belonging despite their differences.

Organizations such as the Paralympic Games, Invictus Games, Boston Marathon, National Wheelchair Basketball Association, and more aid in raising awareness for sports participation for disabled individuals. For example, the Paralympic Games, the largest global sporting event for athletes with disabilities, features the world's elite paraplegic athletes in sports like track, swimming, basketball, etc (IPC, 2025). Recently, the Paris 2024 Paralympic Games, actually broke records with 12,941 hours of coverage globally and paralympic related internet searches broke one billion searches for the first time ever, highlighting the effect of paraplegic athletes on the world and how they inspire those around them (IPC, 2025). These organizations and events have instilled confidence, self-efficacy, social integration, and many more benefits to help transform the lives of disabled athletes.

Existing Apps

Currently, there are not many apps on the market for paraplegic people looking to become more active, find out about the accessibility of locations, and fit their needs to stay in shape and prevent both mental and physical health risks. There are a few apps that target people with spinal cord injuries and wheelchair athletes and focus specifically on workouts tailored to people in wheelchairs. Such apps include No Limits Mobile, Wheel with Me Adapt Fit, Ability

360 Sports & Fitness, and Wheel Fit - Wheelchair Fitness (Ability360, 2016; Apps, 2022; Conner, 2022; Inc, 2020; Karavdic, 2023). By providing workouts, progress reports, and other features, these apps create a helpful, resourceful platform to simply help disabled athletes stay active.

On the other hand, one of the major problems with apps like Wheel With Me and Wheel Fit are that they either cost money to download or are free to download, but customers must then pay a monthly subscription to gain full access to their library of exercise videos or various in app features. Prices range from $14.99 a month to $20 a month. For many people, this subscription can be far too expensive and another barrier to working out. Additionally, Ability 360 Sports & Fitness is only available to residents of Phoenix, Arizona, limiting their service to just a small portion of the many disabled people looking for exercise across the world. While some offer group spaces on other sites, these apps also do not provide an in-app community space for people to talk to peers or ask for help, which is one of the key benefits of adaptive sports.

Purpose of Proposed Research

Through looking at all of the articles mentioned above, it is clear that there are a multitude of challenges that disabled athletes face everyday that prevent them from exercising and staying fit. These challenges include limited access to the correct facilities and equipment, dependence on others, transportation, and stigma in public. Additionally, there are many possible solutions that can be developed through awareness of the needs of disabled athletes and thus accommodating them while also encouraging their own independence and a feeling of belonging in society. As Sá et al. (2012) found in their research, there was a lack of availability and accommodation for disabled athletes, highlighting the need for a resource that provides disabled athletes with adaptive exercise, a community space to talk within, share their thoughts and

progress, and more. The proposed research is to develop an app that accommodates those needs as well as allow people to rate nearby facilities for their accessibility. Like No Limits Mobile, Wheel with Me Adapt Fit, Ability 360 Sports & Fitness, and Wheel Fit - Wheelchair Fitness, the app will also provide workouts for disabled athletes, except it will tailor the workout based on the kind of disability rather than just focusing on wheelchair workouts.

Research Design and Methods

Proposed Solution

To help accommodate disabled athletes, the proposed solution is to create an app titled Ingenium Fit. This app is designed to bridge the gap between accessibility, community, and performance support by offering a unique platform where athletes may connect with each other, discover personalized resources, and improve their physical and mental health. Ingenium Fit emphasizes inclusivity by ensuring people with all kinds of disabilities can access training guidance, adaptive exercise programs, and connect with their peers.

The purpose of this app is to empower disabled athletes to thrive both physically and mentally by shrinking the challenges to participate in disabled athletes and provide support from peers. Many disabled athletes face challenges such as limited access to adaptive equipment, lack of community connection, a feeling of dependence on others, transportation issues, and stigma that affects their mental health. This app provides necessary tools to help disabled athletes such as adaptive training recommendations, community support, a list with adaptive facilities in the area, and progress reports, ultimately contributing to the hope of encouraging and aiding more disabled athletes. In the end, this app aims to become a centerpiece in disabled athletes' lives that can help them overcome the many societal barriers these athletes face.

App Features

Ingenium Fit is designed with disabled athletes in mind. More than providing workout suggestions like other apps, it caters to all aspects of being a disabled athlete, including building community, resources, and information about nearby accessible facilities that they can use to train. Table 1 shows how Ingenium Fit compares to other apps currently available.

Table 1

	Free/No Monthly Subscription	**Community Post Function**	**Resources & Exercises Based on Multiple Disabilities**	**Rate Nearby Facilities for Accessibility**
No Limits Mobile	✓	X	X	X
Wheel with Me Adapt Fit	X	X	X	X
Ability 360 Sports & Fitness	X	X	X	X
Wheel Fit - Wheelchair Fitness	X	X	X	X
Ingenium Fit	✓	✓	✓	✓

Note. Comparison of Ingenium Fit with Existing Apps on the Market

Ingenium Fit has a number of unique features, including profile personalization, an activities feed, resources and exercises based on disability type, accessibility ratings of nearby facilities, and security and trust. These features are further explained below.

Profile and Personalization. Within Ingenium Fit, each athlete can create a personal profile that enables them to choose a username, connect with peers, follow others, and create an individualized and personalized environment for every user. This feature allows users to control their privacy settings, language preference, what appears on their feed, and more. Ultimately,

creating a personalized profile enhances the experience for users by accommodating each and every unique person.

Activities Feed. Another feature of Ingenium Fit is the activity feed that shares friend updates, allows users to post and interact amongst each other, and helps create a sense of community and support among users. While this feature has a feed tailored to who the user is following and friends, the activities feed also aims to connect users with others by having a "Recommended Posts" section. In this section, users can find others on the app that share similar goals, disabilities, or focuses. This activity feed allows users to post any updates about life, rehabilitation progress, and celebrate their achievements or milestones. Additionally, athletes can like, comment, and direct messages to each other all within the app. The hope for this peer engagement is to further strengthen the community through support for others, connection, and reducing isolation of disabled athletes.

Resources and Exercises Based on Disability. The app will also provide several resources to help disabled athletes improve their physical and mental health in society. Beginning with the recommended workouts and informational content page, this feature allows disabled athletes to easily find quality workouts for them that could help them with rehabilitation, daily exercise, sport-specific training, and more. Another resource is the ability to find accessible facilities within the app that others have rated or inputted. By providing this, the app hopes to help disabled athletes overcome the challenges of finding a proper facility with the right accommodations, resources, and people to create a positive workout experience. Additionally, the app allows athletes to search by category to find any specific content they want to find out more about, creating a more efficient app. By gaining connections and building a sense of community, users will also improve their mental health, but the app will also provide mental

health resources such as a link to connected non-profits, such as Champion Minds which focuses on the mental health of student athletes.

Accessibility Ratings. Not only does the app provide a map of accessible facilities but it also allows users to rate these facilities within the app based on their experience to help other users decide whether or not the location fits their needs and expectations. This feature allows users to determine whether a nearby location has accommodations for their specific needs and to avoid facilities that lack more inclusive equipment.

Security and Trust. Ingenium Fit provides a FAQ and support section where athletes can find answers to common questions about the app. This can help support users with varying levels of ability or comfort with technology. Additionally, the app will incorporate key security measures such as password recovery, account verification, and necessary privacy policies to ensure users that their information is safe. Ingenium Fit prioritizes the safety and reliability of the app to always give users confidence in using the app to whatever their needs may be.

Materials and Participants

This study will use a study design that centers around Ingenium Fit, a mobile app that provides disability-tailored exercise guidance, community features, accessibility ratings of facilities, and more. Phase 1 is a formative usability study that uses brief interviews and feedback to improve the app. Phase 2 is beta testing and will last around four weeks. It will include pre/post surveys, weekly micro check-ins, in-app data analysis, and optional interviews to help gage the efficiency of the app.

This study will target para athletes ranging from recreational to elite that are engaged in adaptive or mainstream sport. As part of this study, all International Paralympic Committee disability classes are a part of the target audience. The study will enroll any individuals between

the ages of 18 and 22. The targeted audience does not include those who cannot provide informed consent, an inability to exercise safely, or are unable to have the app, Ingenium Fit, installed.

Participants may be recruited through connections to collegiate adaptive sports clubs and teams, non-profit organizations, rehabilitation clinics, social media, and/or connection to others. All parts of this study will happen online while optional in-person sessions may become an option. https://www.apa.org/about/policy/guidelines-ethical-conduct-high-school-students.pdf Phase 1 will enroll roughly 12-15 participants to create a diverse, accurate representation of the app's results and issues. Phase 2 will enroll roughly 60-80 participants to see a broader effect of changes made as a result of the previous surveys/studies.

Materials include

- Ingenium Fit on iOS/Android/web
- Surveys (pre and post) measures of activity, listed barriers/facilitators, mental health and well being, exercise efficacy, reliance on others, app usability
- Weekly micro check-ins: in-app surveys on pain/fatigue, barriers/facilitators, sessions completed, and general mood
- Accessibility supports: screen-reader compatibility, adjustable font/contrast, captioned media, keyboard navigation, plain-language summaries, and interpreter availability
- Possible Incentive:

Data will include survey responses, in app check in results, disability content assessments, time spent in app, community interactions, and interviews. The study will obtain approval from all participants to be a part of the study, and the study results will be released anonymously. Participants may withdraw at any time during the study.

Procedure

The first part of this sturdy will begin with interested individuals giving their consent and confirming their eligibility; accessibility needs will also be documented. Participants will take a brief demographics and sport profile form as well as mention some barriers and facilitators when they participate in sports or exercise. After downloading the app, participants will complete their profile creation , indicating their disability type, finding workouts, logging sessions, locating and rating facilities, posting to community feed, and adjust their preferred settings. The profile creation is in an effort to help them better understand the app and aid *Ingenium Fit's* improvement. Participants will complete a System Usability survey and share their thoughts about any missing features, language accessibility, nuances, etc. Findings will allow the app to develop and fix any errors that would make the life of disabled athletes easier.

After this initial survey, the next part of the procedure will last roughly four weeks with participants completing the registration process during the first couple days, completing baseline surveys about their activity, barriers/facilitators, mental health, dependence on others, etc. Participants will figure out what settings they prefer best and have a general idea of how to engage in the app. Participants will then set their personal goals and complete the first weekly micro check-in which will automatically be collected and analyzed for data. During the next phase of the procedure, participants will use *Ingenium Fit* to complete at least three disability-tailored workouts per week, comment or post in the community to engage with peers, submit facility accessibility ratings when visiting training locations. The collected data from the weekly micro check-ins will be used to understand how the app is improving the lives of disabled athletes. Automated, low-burden reminders will be sent out in the case of inactivity for over a week through a push notification. Participants are always able to opt out of participation.

Participants will complete a short survey on usefulness and possible improvements after the first four weeks. Lastly, participants will repeat the baseline survey, complete useability surveys, and provide any other feedback they would like. These surveys are meant to indicate any improvements the app had on their lives and delineate areas in the app that need further redevelopment.

Preliminary Suppositions and Implications

Goals and Outcomes

The goals of Ingenium Fit include building consistent participation and positive training habits among para athletes, especially since they face environmental, social, and logistical barriers in trying to exercise. By pushing towards this goal, the hope is for para athletes to improve their mental and physical health and also aid them in living more independent lives while building a supportive community. Within the app, Ingenium Fit looks to foster a community of support and build connections between para athletes to aid them in their health and daily lives.

For the study, the outcomes could inform clubs, clinics, organizations, adaptive sports programs, and sports facilities how to design accessible sports programs and how to accommodate their needs in terms of equipment, coaching, and awareness. Currently, there is little to no field-tested research on how effective facilities, apps, or resources are in aiding disabled athletes' lives. Research on Ingenium Fit looks to help shape the guidelines as to how para athletes should be treated in regards to facility features, transportation accommodations, stigma-reducing practices, and inclusivity in sports. Hopefully, this research will inspire others to take action with further research and improve the lives of para athletes in a meaningful way.

Risks and Challenges

With all exercise, there is always a risk of injury, especially when performing exercises at home or without possible proper supervision or guidance. Regardless of experience or skill level, proper form is required to prevent injury and achieve results. To combat the risk of potential injury, Ingenium Fit will provide tips and reminders on frequently-made mistakes while users exercise as well as alternate versions of the same exercise if the exercise is too easy or difficult. Additionally, the app will provide resources and advice on injury prevention, recovery, and generally cater to the needs of all athletes with different experiences.

One possible challenge is the lack of continuous use by para athletes. Ingenium Fit looks to keep users engaged and motivated to continue to use the app and exercise by creating a safe, caring community, reliable and effective resources, and a generally trustworthy, accessible app. Specifically, Ingenium Fit will try to build a community through motivating others, staying connected through comments, and having posts. Furthermore, the app will have users unlock personalization options such as filters, stickers, trophies, and more as they reach certain milestones while using the app. For example, for logging into the app ten times, the user would be rewarded a sticker he or she can use on the profile page.

Another possible challenge of running this app is the cost of maintaining the app and uploading videos. A potential solution to this would be getting volunteers from colleges, professionals, and any other people who would like to help the disabled community to make or find videos to upload and keep the community active. Volunteers could come from various non-profits, schools, and locations because the process can be completely done online. If needed, funding could also come from sponsorships, grants, or fundraising.

Future Research

Future research should be able to build upon the results of the survey which will indicate the feasibility of future endeavors of Ingenium Fit and broader research about disabled athletes. Furthermore, future research could help further compare Ingenium Fit to specific apps and decipher which features like the community feed, facility ratings, or tailored workouts are the most essential to the success of paraplegic athletes. These comparisons could show how Ingenium Fit competes with other apps available on the market as well as how it could adapt further, catering more holistically towards the needs of disabled athletes. Further tests could also include whether improvements in self-efficacy, perceived stigma, and access to fitting transportation and facilities leads to significant improvements in paraplegic athletes' health, physical and mental, as well as the participation of disabled people. Additionally, work could also help investigate more well-known brands such as LA Fitness, 24 hour fitness, etc. and their efforts to try and accommodate disabled athletes. If the brands are working towards improvements, research could also measure how effective those changes are in contributing to positive facilitators and factors in disabled athletes' lives.

Conclusion

1. Why the study should be done.
2. The specific purpose of the study and the research questions it attempts to answer.
3. The decision to why the research design and methods used where chosen over other options.
4. The potential implications emerging from your proposed study of the research problem.
5. A sense of how your study fits within the broader scholarship about the research problem.

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Remember to site the CDC, WHO, and IPC

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