SHOULD THE EXERGAMING INDUSTRY TARGET ADULTS? AN EXPLORATORY SURVEY

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ABSTRACT

Background: Exergames, video games that contain interactive physical activity, tend to be targeted for children or older adults with disabilities. However, the exergaming industry has not focused on the general adult population. Research Questions: Can exergames effectively entertain adult users? What do adults perceive to be the benefits and drawbacks of exergaming? What sections of the adult population (if any) should the exergaming industry be targeting? What design and marketing suggestions can be made based on the circumstances of adult interest in exergaming? Research Methods: Literature review and online survey hosted by Qualtrics. Participants: Sixty adults responded to the survey through Amazon Mechanical Turk. Results: Adults found exergames to be entertaining and to currently provide a moderate workout. The main advantages of exergaming were generally perceived to be their convenience, entertainment, and social aspects. The main drawbacks were the equipment costs and the perceived inability of exergames to provide an adequate workout. Conclusion: Adults are generally interested in exergaming, provided that exergames are entertaining, deliver a moderately vigorous workout, and offer a social/multiplayer aspect. If designed and marketed correctly, adult-targeted exergames could physically benefit adults and financially benefit the exergaming industry.
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Chapter 1

Introduction

“A new government study estimates that nearly 80 percent of adult Americans do not get the recommended amounts of exercise each week, potentially setting themselves up for years of health problems” [Jaslow, 2013]. The health risks associated with being overweight or obese are well documented: type 2 diabetes, heart disease, high blood pressure, and strokes are only a few of the numerous problems awaiting the unhealthy masses. Not as well known, however, are the U.S. government’s physical activity guidelines, which recommend that adults get at least 2.5 hours of moderate-intensity aerobic activity each week [Centers for Disease Control and Prevention, 2014]. With nearly 80% of the adult American population failing to reach these goals, two-thirds of whom are considered to be overweight or obese, it is clear that the “obesity epidemic” is one of staggering proportions. So why is it, then, that so many Americans are not exercising when it could only benefit them? Some of the most frequent reasons for this include lack of motivation, money, and time [“Why Do People”]. Often, individuals believe that they have better things to do with their free time and money than spend it on exercise equipment and gym memberships. Furthermore, exercising is commonly perceived to be unpleasantly strenuous and monotonous.

Consequently, there has been a rather significant movement to turn exercise into a game. Exergames, also known as active video games (AVGs), are video games with an element of interactive physical activity. The idea behind exergames is that, first, they make exercise seem like an entertaining leisure activity, rather than a chore, and, second, they can be played in the convenience of the user’s own home. As Skinner states, the “enjoyment of the game is the primary goal of game developers in motivating individuals to play video games” [2012, p. 23]. Video games have also been known to have a “positive impact on players’ cognition and
knowledge,” including (but not limited to) the improvement of players’ reading skills, logical thinking processes, and strategic planning [Skinner, 2012, p. 22]. Therefore, exergames would conceivably be “working out” the users’ brains as well as their bodies.

Despite all of the potential benefits, however, exergames tend to be ignored by adults for two particular reasons: (1) exergames are not perceived as providing adequate exercise, and (2) they are generally designed and marketed for children rather than adults. Past research studies on exergaming have overwhelmingly focused on children and older adults [Caparosa et al., 2011] [Maillot & Perrot, 2012] [Bailey & McInnis, 2011] [LeBlanc et al., 2013]. The exergaming industry’s narrow focus is causing them to neglect a substantial market - adults. Although children have been the focus of the exergaming industry, the average video game player is 30 years old [Entertainment Software Association (ESA), 2013, p. 3].

In this paper, I address exergame exercise intensity levels in terms of the U.S. government’s physical activity guidelines, adult perceptions of and motivations for exergaming, and which specific sections of the adult population should the exergaming industry target in the future. The purpose of my research study was to determine whether adults are interested in exergaming, and to provide exergame design and marketing recommendations based on the circumstances of said adult interest.

Exergaming should not be portrayed as something that is just for children or older adults; All adults can take advantage of the many benefits that exergames can provide, such as convenient and relatively affordable motivation, entertainment, exercise, and social interaction. Therefore, the exergaming industry should begin to identify overlooked adult niche markets, designing more adult-targeted and exercise-intensive games to suit these populations, and effectively marketing these games to their intended audiences.
Chapter 2

Background

“A study last year linked physical inactivity to more than 5 million deaths worldwide per year, more than those caused by smoking” [Jaslow, 2013]. The prevalence of obesity in adults has more than doubled since the 1960s; about 36% of adults living in the United States (age 20 and older) are currently obese [Weight-control Information Network] (Figure 2-1). By 2030, it is predicted that 42% of American adults will be obese [“Benefits”].

![Trends in Overweight and Obesity among Adults, United States, 1962–2010**](image)

**Figure 2-1 Trends in Overweight and Obesity Among Adults**

To reiterate the risks facing those who are overweight or obese, some of the health problems that can be expected include: type 2 diabetes, heart disease, high blood pressure, nonalcoholic fatty liver disease, osteoarthritis, stroke, and some types of cancer. Even those who
are meeting the government’s recommendation of 2.5 hours of moderate aerobic exercise (or half that, of vigorous exercise) can still be at risk if they are relatively inactive during the other 160 hours of the week. In 2012, a study consisting of over 200,000 people concluded that the more time they spent sitting, the higher the risk became that they would die sooner [Wagner, 2012]. “Even after taking into account physical activity, weight, and health status, researchers found that the unsettling association held” [Sifferlin, 2012]. The following statement highlights the connection between sitting for long periods of time and a higher risk of death: “lack of movement triggers really unhealthy metabolic changes” [Sifferlin, 2012]. So, although they are less likely to be harmed by extended sitting than those who lead more sedentary lives, even active people should strive to sit less during the day. After all, even people who meet the physical activity guidelines “spend more time sitting than they do sleeping, a trend that seems to keep growing as people send e-mails or text messages at work instead of getting up to talk to a co-worker or order things online instead of shopping for them” [Wagner, 2012]. In addition to the unhealthy hours of sitting at desk jobs, 90% of the average adult’s leisure time is spent sitting [Sifferlin, 2012]. Consequently, adults should not only be combatting excessive weight and obesity, but also the amount of time spent sitting.

When the challenges of physical activity are framed in this manner, the benefits of exergames (even those that can only be considered light intensity) are even more relevant. Although literature pertaining to both exergaming and adults is somewhat sparse, the majority of studies have found that exergames provide light to moderate physical activity [LeBlanc et al., 2013] [Graves et al., 2010] [Harvard Heart Letter, 2012] [Miyachi, Yamamoto, Ohkawara, & Tanaka, 2010]. The moderate intensity exergames could count towards the government’s aerobic physical activity guidelines. The light intensity exergames would, at least, reduce the user’s time spent sitting. As another study demonstrated, adults playing a light-to-moderate intensity dance exergame expended nearly 3 times the amount of energy than they did at rest [“Benefits”].
Therefore, while there is certainly plenty of room for improvement in the exergaming industry regarding activity intensity, exergames provide greater benefits than sedentary behavior, and some can even be used in place of traditional aerobic exercise.

Three major concerns are often raised about exercising – motivation, money, and time. Research on the subject of exergame motivation points to the same conclusion: “For adults, the main advantages exergaming has over traditional sports and fitness activities are that it is more entertaining and, perhaps just as importantly, more convenient” [“Benefits”]. The enjoyment of an activity is, after all, “a key determinant influencing the allocation of one’s time to that pursuit” [Graves et al., 2010, p. 393]. In order for the exergaming industry to be successful with the adult population, it is vital to convince adults that exergames are a more entertaining alternative to the gym. Furthermore, “if fun alone isn't a sufficient motivator, improvements in balance, muscle tone, and coordination that people report from exergaming are additional incentives to keep playing” [Harvard Heart Letter, 2012, p. 3]. Improved endurance, agility, and reaction time have also been reported as benefits to exergaming.

The social aspect of some exergames has also been shown to provide numerous motivational benefits: “82 percent of players who took up active gaming started to play more with their friends and family over time” [“Benefits”]. In terms of the physical benefits of social exergaming, players push themselves harder during group exercise, and “they are less likely to stop working out in the middle of a routine than they would be if they were exercising alone” [“Benefits”]. Furthermore, the mental benefits of social exergaming have been documented: "when played with a group, exergames can generate encouragement and social support that improve a player's psychological state" [Harvard Heart Letter, 2012, p. 3]. It was also found that “participants worked harder when given the opportunity to interact with the video game versus a non-interactive exercise condition” [Siegel, Haddock, Dubois, & Wilkin, p. 171]. So, even exergames without social aspects have been found to inspire extra effort than traditional exercise.
Another motivating factor is that studies have shown exergaming to be associated with other positive physical effects, in addition to any aerobic exercise they provide. For example, an American Heart Association survey of those who took up active gaming showed that 68% of those people became more physically active as a result, and 58% also took up a new fitness activity since they started playing [“Benefits”]. The positive cognitive effects of video games may also apply to exergames. As described earlier, these effects include improving cognitive and reading skills, motivating logical thinking processes, strengthening observational skills, acquiring basic and factual knowledge, enhancing one’s problem-solving and decision-making abilities, developing strategic planning, and supporting spatial awareness [Skinner, 2012, p. 22]. The exploration of this topic is another potential area for exergaming research.

To summarize, exergaming is an entertaining, engaging, and potentially social way of gaining numerous physical, cognitive, and mental benefits. When designed effectively, the enjoyment that adults would experience while exergaming should provide enough motivation.

From a financial perspective, there is some initial investment that must be made in terms of purchasing a video game console, which can be expensive ($250-$300). However, as of 2012, the average cost of a gym membership was $55 per month [Williams, 2013]. In other words, the cost of a console would be paid back within about 6 months. The average price of traditional cardio equipment, such as elliptical trainers and treadmills, is at least 5 times as expensive as a game console, often costing between $1500 and $2000 [Lo, 2014]. The exergames themselves can also be on the expensive side; like any video game, recently released exergames generally cost between $40 and $60. However, there are sometimes sales and discounts in order to encourage customers to purchase new games, and older or gently used pre-owned games are available for purchase at much more reasonable prices. While the initial price may be discouraging, the value of investing in a game console and a few entertaining and vigorous games would be equal to less than a year’s worth of a gym membership. The games could provide years’
worth of entertainment (as well as all the other benefits of exergaming) for not only the player, but the player’s friends and family as well.

Time has also become less of an issue thanks to exergaming. The convenience of having the ability to exergame within one’s own home whenever the mood strikes is a great benefit. Therefore, the challenges of traveling to and from the gym and finding appealing fitness classes that are scheduled at convenient times become less problematic. Health games are frequently customizable as well, which makes them accessible to people of all different fitness levels [“Benefits”].

Finally, the issue of general adult exergame accessibility must be addressed. At present, the large majority of exergames are being designed and marketed for children and adolescents. The literature in the field reflects this disconnect as well; most exergame research is related to children [Bailey & McInnis, 2011] [LeBlanc et al., 2013] [Daley, 2009]. Of the exergame literature that is not related to children, most of it is concerned with how exergames can be used to help older adults, especially those with disabilities [Maillot & Perrot, 2012] [Caparosa et al., 2011] [Rosenberg et al., 2011]. Essentially, neither the exergaming industry nor the research community has focused on exergames and the adult population. As far as a business strategy goes, however, this seems to be rather counterintuitive for the exergaming industry. According to the 2010 United States Census Bureau, over 60% of America’s population consists of people between the ages of 18 and 64 [U.S. Department of Commerce, 2011, p. 2]. The potential for exergame interest within this age group certainly exists; Just Dance 4 (a light-to-moderate intensity dance exergame with a 10+ age rating, as opposed to the usual E for Everyone) was one of the top 5 highest-selling video games in 2012 [ESA, 2013, p. 9]. While exergames designed with children in mind are usually playful and innovative, AVGs designed specifically for adults tend to mimic workouts and classes that one might find in a gym. Creating more enjoyable,
exercise-intensive exergames for adults would not only earn the exergaming industry a substantial increase in revenue, but also simultaneously provide the adult population with numerous benefits.
Chapter 3

Research Methodology

Data Collection

The research study utilized an online survey for data collection, which was approved by the Pennsylvania State University’s Office for Research Protections. At the beginning of the survey, all participants were presented with the informed consent form; completing the survey to any degree signified participant consent. The data collection occurred in March 2014.

The survey questions were designed to examine adult interest in exergames, determine adult motivations behind exergaming, and ultimately identify overlooked niche markets for exergames within the adult population (Appendix A). With these objectives in mind, the nineteen questions were sorted into four categories: exercise preferences and habits, video game preferences, expectations for and past experiences with exergames, and demographics (Table 3-1). I also included one question to ascertain whether the participants were paying attention or not.

<table>
<thead>
<tr>
<th>Question Category</th>
<th>No. of Questions</th>
<th>Example Question</th>
<th>Question Numbers</th>
</tr>
</thead>
<tbody>
<tr>
<td>Exercise preferences and habits</td>
<td>2</td>
<td>Do you prefer to exercise alone or with a buddy?</td>
<td>2, 3</td>
</tr>
<tr>
<td>Video game preferences</td>
<td>4</td>
<td>What are your favorite video game genres?</td>
<td>4 - 7</td>
</tr>
<tr>
<td>Expectations for and past experiences with exergames</td>
<td>7</td>
<td>Under what circumstances would you choose exergaming over traditional exercise?</td>
<td>8 – 11, 13 - 15</td>
</tr>
<tr>
<td>Demographics</td>
<td>5</td>
<td>Are you a parent?</td>
<td>1, 16 - 19</td>
</tr>
</tbody>
</table>

Table 1 Survey Question Categories
Participants were permitted to skip questions, so some questions have less than the full response rate.

The survey was developed using Qualtrics, an online survey development tool. I recruited participants through Amazon Mechanical Turk, a crowdsourcing Internet service for work that requires human intelligence. The participants were provided a link to the online survey, which was hosted on Qualtrics, through Mechanical Turk. Each participant was compensated $0.20 for completing the survey.

Participants

To qualify for the survey, participants had to be adults between the ages of 18 and 64 years. Mechanical Turk requires a time limit on Human Intelligence Tasks (HITs), so participants were given 20 minutes to complete the 18 questions. In pre-testing, volunteers were able to complete it in less than 5 minutes. The average time to complete the survey was 3.5 minutes. For this exploratory study, in the interest of time, I limited the number of survey responses to sixty. Since much of the current exergaming research has focused on US participants, I also limited the survey to those residing within the United States.

Data Analysis

The results were compiled into a Qualtrics report, which was later exported to an Excel spreadsheet and grouped by question category. The results were then analyzed on a question-by-question basis, as well as divided based on demographics and participant answers to certain questions, in order to identify trends and perspective differences among different groups. I
primarily looked for consensus among the participant groups to identify emerging themes and implications.
Chapter 4

Results

In this chapter, I describe the results focusing on (1) demographics (2) views on exercising (3) views on video games, and (4) views on exergaming. For a full transcript of the survey results, please see Appendix B.

Demographic

Sixty participants, 30 male and 30 female, completed the survey. The average age was 34.6 years (SD = 12.0 years) (Figure 4-1, response to Q1 and Q16). Male participants tended to be slightly younger than female participants; the mean male age was 31.9 ± 10.4 years, while mean female age was 37.2 ± 13.1 years. The participants were mainly white adults (85%) and only a minority of the participants were parents (38%).

Figure 4-1 Participant Age/Sex
**Views on Exercising**

Most participants frequently engaged in light intensity exercise five to six times per week on average (Figure 4-2, response to Q2). The participants undertook both moderate and vigorous intensity exercise about one to two times per week, on average. 60% of participants preferred to exercise alone, while the rest preferred to exercise with a buddy (20%) or had no preference (20%).

![Figure 4-2 Weekly Exercise Time/Intensity](image-url)
Views on Video Gaming

The large majority of the participants said they enjoyed and/or frequently played video games (87%). Participants in all age groups enjoyed video games, with the average age of 34.8 ± 12.4 years, which is similar to that of the overall population sample.

![Favorite Video Game Genres](image)

**Figure 4-3 Favorite Video Game Genres**

First or third person shooters (56%), puzzle games (54%), role-playing games (RPGs) (46%), and Facebook/phone games (42%) were the participants’ preferred types of video game (Figure 4-3, response to Q5). [Note: participants could choose multiple answers for this question, therefore the percentages add up to more than 100%.] Half of the game-playing participants preferred to play video games alone (50%), while a significant minority preferred playing with a buddy (33%) and the remaining participants had no preference (17%).
Views on Exergaming

The large majority of the participants had previously played at least one exergame (72%). Of those who had exergamed before, the participants reported that their experience was generally both moderately entertaining and moderately vigorous (Figure 4-4, response to Q10). They tended to perceive the exergames as being more entertaining than vigorous. When asked which exergames they had played, participants answered Wii Sports (44%), Wii Fit (30%), and Just Dance (30%). Of the 17 participants who had never exergamed, most were either not interested in exergaming (29%) or did not possess the necessary equipment (24%).
When asked to consider the circumstances under which participants would choose exergaming over traditional exercise, the most common answer was when the participant was not able to or had little desire to leave the home, such as while taking care of children or during inclement weather (Figure 4-5, response to Q13). Only 10 of the 60 participants (17%) claimed that there were no circumstances under which they would choose exergaming over traditional exercise.
Figure 4-6 Mean Exergame Attribute Importance

Entertainment was regarded to be the most critical exergame aspect (Figure 4-6, response to Q14). Participants also expected a fairly vigorous workout. The presence of a social/multiplayer aspect was the lowest priority. A majority of participants said they would most likely use exergaming to replace some of the sedentary behavior in their lives (73%), while the rest of the participants said they would use exergaming to replace some of the traditional exercise in their schedules.
Chapter 5

Discussion

In this chapter, I discuss the perceived benefits and drawbacks of exergaming, design and marketing recommendations for exergaming for adults, limitations of the study, and future of exergames.

Perceived Benefits of Exergaming

Based on the survey results, exergaming had three major benefits. First, participants were most inclined to exergame when they were not able to or had little desire to leave the house, such as while taking care of children or when the weather was bad for outdoor activities or driving to the gym. Participants, therefore, perceived convenience to be the most compelling benefit of exergaming. This finding is consistent with that of previous research [“Benefits”]. Exergaming can save users the time and aggravation normally associated with commuting to a gym or dealing with inclement weather. Some participants also appreciated the fact that exergames could be played in a private setting, because they were too embarrassed to exercise in front of others. The convenience of exergames – from their location in the home to the precise control over the amount of time spent playing them – is potentially the most persuasive argument in their favor.

Second, the entertainment value of exergaming is a crucial motivating factor when it comes to exercise. In general, participants rated entertainment as the most important exergame aspect, over the delivery of a vigorous workout and the inclusion of a social/multiplayer aspect. Participants who had played exergames before found them entertaining. Several of the participants viewed exergaming as a solution for boredom, stating that they would use exergames for a change of pace whenever they were tired of their usual exercises or video games. As with
the benefits of convenience, the importance of entertainment in exergaming has also been well documented in previous research [Harvard Heart Letter, 2012, p. 3].

Third, over half of the participants thought that it was important to include a social/multiplayer aspect in exergaming. Currently, many exergames contain both single and multiplayer modes. The benefits of social exergaming, such as increasing the user’s effort input and improving the user’s psychological state, have been explored in previous research studies [“Benefits”] [Harvard Heart Letter, 2012, p. 3]. The competitive aspect of social exergaming was mentioned favorably by some of the participants as well.

Perceived Drawbacks of Exergaming

Although the exergames did have their benefits, they also had some significant drawbacks from the participants’ perspectives. The most frequently discussed drawback of exergaming was the initial cost of hundreds of dollars for a console and a couple of exergames. However, as stated previously, the cost of the console and exergames would cover less than a year of a gym membership. Therefore, for those who cannot afford a gym membership, investing in a console and a few vigorous, entertaining games would be much less fiscally demanding than a membership and would provide a higher value because (unlike gym memberships) exergames do not expire. Furthermore, exergames are far more motivating than the at-home gym solutions of YouTube workout tutorials and basic exercises. Those who can afford a gym membership and/or their own traditional exercise equipment, however, should not discount exergames. As discussed earlier, even those who are fulfilling the government’s exercise recommendations are spending too much of their time inactive, which can cause extremely unhealthy metabolic changes. Therefore, exergaming during times usually spent engaging in sedentary leisure behavior would
deliver very real benefits for all adults. Most participants indicated that they were more inclined to exergame in place of sedentary behavior rather than replace traditional exercise.

Second, participants were skeptical of exergaming’s ability to provide an adequate workout. It is true that “the kind of intense power workout many get at the gym with weight machines and ellipticals can be harder to attain with exergaming” [FitDay]. This issue is something that the exergaming industry should address in its future research and game design. Exergames generally provide light-to-moderate physical activity, although a few studies have claimed that certain games can even provide vigorous intensity exercise [Bailey & McInnis, 2011, p. 1]. Any moderate or vigorous intensity exergame would count towards the government’s aerobic physical activity guidelines and, as previously established, even light intensity exergames provide health benefits.

Third, a drawback described by several participants was the issue of space. The lack of space can create problems for users in close quarters, especially in terms of the social aspect of exergaming. A single user is generally expected to be between 4 and 5 feet away from the monitor and sensor, and to have a full diameter of their arms between 5 and 6 feet [Plunkett, 2013]. With two users side by side, they would have to move further back for the sensor to catch both of them, and then the wingspan needed would be anywhere from 10 to 12 feet. Adding in two more people to make it a four-person game would make a fairly large room mandatory, even with the players staggered (Figure 5-1).
Fourth, a few participants preferred traditional exercise to exergaming. One participant explained that this was because he could control the pace of his exercise more effectively with traditional exercise than with exergaming. This viewpoint is reflected in previous research: “a lot of those who work out like the idea of crafting their own fitness programs, and may feel more comfortable with traditional fitness equipment” [FitDay]. Many exergames do allow users to set and adjust their fitness levels and workout intensities. However, this control is obviously much less precise than the absolute control one would have over a traditional workout regimen.

*Design and Marketing Recommendations*

Understanding what users’ expectations and preferences are when they play an exergame is essential to both the design and marketing of exergames.
First, the most important aspect of an exergame is its entertainment value. If the user decides to exergame, her fundamental expectation is that she will be entertained. The adult population encompasses a wide variety of ages. The breakdown of this population into distinct niche markets is a potential direction for future research. Based on this research study, a large majority of participants enjoy and frequently play video games. Of these participants, males tended to prefer first or third person shooters and role-playing games (RPGs), and females preferred puzzle games and Facebook or phone applications. While the object of first and third person shooters, puzzle games, and RPGs are generally different, these games typically incorporate similar aspects of action and adventure, so mapping the physical movements necessary for one (i.e. running, jumping, squatting, fighting) could theoretically apply to them all. Once these key, universal movements can be effectively tracked, any number of exergames can be created around them. Consequently, one recommendation is that popular video games in each of these genres be translated into exergame form. Only slightly less important than the entertainment factor is the preference that exergames provide a moderately vigorous workout. If translated well, an already-popular game could potentially become even more immersive thanks to the added physical challenge and interactive quality.

Facebook and phone applications are fundamentally different from the other game genres that I have discussed so far, so the approach to translating them must be different. Popular phone and Facebook games, such as Fruit Ninja and Farmville, do not include movements such as running and jumping. For this reason, the translation of such games into exergames would have to be more specialized to each game. A Kinect version of Fruit Ninja already exists, for example, and users must slash with their whole arms in order to cut the fruit and receive points. Another recommendation would be that, instead of paying cash for in-game benefits, the exergame version of an application could require the user to successfully undertake certain physical challenges in
order to achieve those in-game benefits. To reiterate, a moderately vigorous workout is the next most important thing to users after entertainment.

Second, participants who preferred to exercise and/or play video games with a buddy (as opposed to alone) (38%) believed it was more important for exergames to have a social aspect than for the game to provide a vigorous workout. Therefore, the exergaming industry should continue to explore and develop the multiplayer aspects of exergames.

Third, participants who did not enjoy video games did enjoy exergames to a similar extent as those who enjoyed video games also enjoyed exergames. In contrast to the gamers, however, non-gamers rated the workout aspect of exergames more highly than the entertainment aspect. Therefore, if the exergaming industry were to attempt to target non-gamers, I would recommend designing a vigorous game that more closely resembled traditional exercise than video games. However, as the non-gamer participant percentage was extremely low in this study, an area for future research would be to identify whether or not non-gamers are actually interested in exergaming and to understand the conditions for that interest.

In summary, the exergaming industry should be developing entertaining adult exergames that include both a single and multiplayer option and provide a moderately vigorous workout. Some of the participants also proposed other suggestions. One participant suggested a goal-oriented game format to retain user interest, where parts of the game would remain locked until certain goals had been met. Another participant requested that fitness levels be adjustable, and still another mentioned that it would be nice to have the ability to use one’s own music playlist while exergaming. I would recommend that certain design steps be taken to maximize the convenience of exergaming. For example, exergames with unwieldy or difficult to set up equipment are less convenient and will probably not be used as frequently as games that are quick and easy to set up.
In order to most effectively realize the potential for the adult market, the exergaming industry will need to highlight the perceived strengths of exergames and actively address the perceived drawbacks. As this survey has shown, users are motivated to exgame by a number of different incentives – entertainment, convenience, social situations, and beneficial physical activity. Each of these strengths can be impressed upon the target audience during the marketing campaign, though focusing upon the entertainment and social aspects would likely be the most persuasive. The perceived drawbacks of exgame cost and lack of physical intensity must also be addressed in the campaign.

The main idea behind the marketing strategy is to combat the primary reason that adults do not exgame: a lack of interest, which results from a combination of the lack of opportunities to try exergaming and the generally child-targeted exergame market. By designing the right games and marketing them effectively, it is possible for the exergaming industry to catch the attention of the adult population and cultivate interest in exergames.

Limitations

Because of the limited number of participants, significant statistical conclusions could not be derived from the data. Although certain relationships can be implied by these results, no significant relationships can be established without further research and a greater number of participants. In addition, the participants of this study found the survey through Amazon Mechanical Turk. Therefore, this was a convenience sample. While Mechanical Turk workers are not fully representative of the general population, they have been found to be “often more representative of the U.S. population than in-person convenience samples—the modal sample in published experimental political science” [Berinsky, Huber, & Lenz, 2012]. Mechanical Turk
workers generally tend to be younger (18–29 years old), have lower incomes, be male, and identify as liberal [Sides, 2012]. However, as my results show, I encountered a highly diverse range of ages, and my participants were equally likely to male or female.

*The Future of Exergames – Virtual Reality*

The future of exergaming is extremely bright with the possibility of Virtual Reality (VR) exergames becoming more available within the next few years. Virtual reality can be defined as a "technology that enables users to enter computer generated worlds and interface with them three dimensionally through sight, sound, and touch" [Newquist, 1992, p. 93].

The two most anticipated pieces of VR equipment at the moment are the Oculus Rift VR headset, a lightweight head-mounted display that allows users to visually interact with the virtual environment via tracked perspectives, and Virtuix’s Omni virtual-reality treadmill, a device that allows users to “run or jump seamlessly on an enclosed octagon-shaped treadmill and see those actions mirrored in a video game” [MacManus, 2013]. When used together, the two devices provide an extremely comprehensive, responsive, and immersive VR experience (Figure 5-2). The Omni treadmill can be used with any video game that uses standard keyboard input, and it allows users to accomplish practically any motion that a video
game character could (i.e. walk, run, jump, sidestep, crouch) [Wordsworth, 2013].

With these two devices, one would see, hear, interact with, and ultimately experience the video game world firsthand. In other words, a participant would no longer “play” the character; they would become the character. Not only would a virtual reality exergame entertain and immerse a participant, but it would also provide an extremely vigorous workout. Although there are still a few technological issues to iron out (such as the potential for simulator sickness, a side effect caused by lag in the visual display), virtual reality gaming could soon provide the ideal exergame experience [Seppänen, p. 1]. “People have barely scratched the surface in terms of VR game design - the next five years are going to be a wild ride” [Wordsworth, 2013].
Chapter 6

Conclusion

The goal of this research study was to explore whether adults would be interested in exergames and under what circumstances. The study found that adults – regardless of age, parenthood status, and video game persuasion – were generally interested in exergames. In particular, study participants consider exergames to be more than moderately entertaining. In addition to the entertainment factor, adults enjoyed the convenience of exergames as well as the potential for social interaction through multiplayer mode. However, many participants were less excited about the console and game costs, and many appeared to be under the somewhat mistaken impression that exergames do not provide adequate exercise. Many exergames do, in fact, provide moderate intensity exercise, which can count towards the government’s daily recommendation of 2.5 hours of moderate aerobic exercise.

Virtual Reality is in the exergaming industry’s near future. VR is anticipated to bring about the most entertaining, immersive, and vigorous exergame workouts to date. Further studies of the adult population would also be useful to identify more specific niche markets, rather than continuing to market to the vast and diverse adult population as a whole. The findings of this study do, however, support the idea that the more general adult population is interested in exergaming, and the exergaming industry would benefit from targeting this population in the future.
Appendix A

Exergames and the Adult Population Survey

Survey Study on Adult Exergame Opinions and Preferences

INFORMED CONSENT FORM FOR SOCIAL SCIENCE RESEARCH
The Pennsylvania State University

Title of Study: Survey Study on Adult Exergame Opinions and Preferences

IRB #: 45083

Principle Investigator:
Stephanie Beale
Senior, Schreyer Honors College
College of Information Sciences and Technology
smb5859@psu.edu

Purpose of the Study: The purpose of this research study is to determine whether or not adults are interested in exergaming (playing video games that are related to fitness and physical activity), and under what circumstances this interest might be developed into an exergame market.

Procedures to be followed: After reviewing this information and deciding to participate, you will be asked to complete a questionnaire. No other identifying information will be collected.

Duration: It will take approximately 10 minutes to complete the questionnaire.

Compensation: You will be compensated $0.20 for your time through Amazon Mechanical Turk.

Statement of Confidentiality: Your participation in this research is confidential. The data will be stored and secured in a password-protected file and/or within a locked office, as applicable. Your confidentiality will be kept to the degree permitted by the technology used. In the even of any publication of presentation resulting from this research, no personally identifiable information will be disclosed. The Pennsylvania State University’s Office for Research Protections, the Institutional Review Board, and the Office for Human Research Protections in the Department of Health and Human Services may review records related to this research study. In the even of a publication or presentation resulting from the research; no personally identifiable information will be shared.

Right to Ask Questions: Please contact smb5859@psu.edu with questions, complaints, or concerns about this research. You can also call the following number if you feel this study has harmed you. If you have any questions, concerns, problems about your rights as a research participant, or would like to offer input, please contact Penn State’s Office for Research Protections (ORP) at (814) 865-1775. The ORP cannot answer questions about research procedures. Questions about research procedures can be answered by the research team.

Voluntary Participation: Your decision to be in this research is voluntary. You can stop at any time. You do not have to answer any questions you do not want to answer.

Qualification: You must be at least 18 years of age and at most 64 years of age to take part in this research study. If you qualify and agree to take part in this research study, please continue to the questions below.
How old are you?
(If you are younger than 18 or older than 64, please exit this survey now.)

In a typical week, how often and at what intensities do you most frequently exercise?

<table>
<thead>
<tr>
<th>Light Intensity (leisurely walking, mopping, vacuuming, golfing, etc)</th>
<th>Never</th>
<th>1-2 Times a Week</th>
<th>3-4 Times a Week</th>
<th>5-6 Times a Week</th>
<th>Daily</th>
</tr>
</thead>
<tbody>
<tr>
<td>Moderate Intensity (brisk walking, slow bicycling, bathroom dancing, doubles tennis, etc)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Vigorous Intensity (jogging/running, aerobic dancing, fast bicycling, swimming laps, etc)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Do you prefer to exercise alone or with a buddy?
- Alone
- With a buddy
- No preference

Do you enjoy and/or frequently play video games*?
*Facebook and phone applications, such as Farmville and Angry Birds, are included within the term "video games".
- Yes
- No

What are your favorite video game genres? Many games overlap in genre; select all genres that apply to your favorite games.
- First Person Shooter or Third Person Shooter
- Sports (ex. Madden NFL)
- Fighting (ex. Super Smash Brothers)
- Puzzle (ex. Legend of Zelda)
If you selected other, what are your other favorite video game genres?

Do you prefer to play video games alone or with a buddy? (Buddy can be in person or through an online connection.)
- Alone
- With a buddy
- No preference

Have you ever exergamed* before?
*Exergames are video games that are also a form of physical activity and exercise (i.e. Just Dance, Wii Sports, Dance Dance Revolution, Kinect Zumba)
- Yes
- No

What exergame(s) have you played?

Please rate the overall quality of your best (or only) exergame experience.

<table>
<thead>
<tr>
<th></th>
<th>Not at all</th>
<th>Slightly</th>
<th>Moderately</th>
<th>Very</th>
</tr>
</thead>
<tbody>
<tr>
<td>How entertained were you?</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>How vigorous was the activity?</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Why have you never exergamed before?

Have you been paying attention?
- Yes
- No

Under what circumstances would you choose exergaming over traditional exercise?

Please rate the importance of the following exergame attributes.

<table>
<thead>
<tr>
<th>Attribute</th>
<th>Unimportant</th>
<th>Slightly important</th>
<th>Moderately Important</th>
<th>Very Important</th>
</tr>
</thead>
<tbody>
<tr>
<td>Exergame is entertaining/relevant to user's interests</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Exergame provides user with a vigorous workout</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Exergame includes a social and/or multiplayer aspect</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

If you were to begin exergaming on a regular basis, would exergaming more frequently replace traditional exercise or sedentary behavior in your schedule?
- I would use exergaming to replace some of the traditional exercise in my schedule.
- I would use exergaming to replace some of the sedentary behavior in my schedule.

What sex are you?
- Male
Female

**What is your race/ethnicity?**
- White
- Hispanic or Latino
- Black or African American
- Native American
- Asian or Pacific Islander
- Other

**If other, please specify your ethnicity:**

[ ]

**Are you a parent?**
- Yes
- No

Thank you for completing the survey! Your participation has helped us gain valuable insight into adult interest in exergames and the circumstances for that interest. We appreciate your participation. Have a great day!

**Please be sure to select “>>” in order for your responses to be recorded and to receive your completion code. You will need the completion code to receive payment on Amazon Mechanical Turk.**
The Office for Research Protections (ORP) has received and reviewed the above referenced eSubmission application. It has been determined that your research is exempt from IRB initial and ongoing review, as currently described in the application. You may begin your research. The category within the federal regulations under which your research is exempt is:

45 CFR 46.101(b)(2) Research involving the use of educational tests (cognitive, diagnostic, aptitude, achievement), survey procedures, interview procedures or observation of public behavior, unless: (i) information obtained is recorded in such a manner that human subjects can be identified, directly or through identifiers linked to the subjects; and (ii) any disclosure of the human subjects' responses outside the research could reasonably place the subjects at risk of criminal or civil liability or be damaging to the subjects' financial standing, employability, or reputation.

Given that the IRB is not involved in the initial and ongoing review of this research, it is the investigator's responsibility to review IRB Policy III “Exempt Review Process and Determination” which outlines:

- What it means to be exempt and how determinations are made
- What changes to the research protocol are and are not required to be reported to the ORP
- Ongoing actions post-exemption determination including addressing problems and complaints, reporting closed research to the ORP and research audits
- What occurs at the time of follow-up

Please do not hesitate to contact the Office for Research Protections (ORP) if you have any questions or concerns. Thank you for your continued efforts in protecting human participants in research.

This correspondence should be maintained with your research records.
Appendix B
Exergames and the Adult Population Survey Results

Survey Results
Last Modified: 03/20/2014

1. How old are you? (If you are younger than 18 or older than 64, please exit this survey now.)
2. In a typical week, how often and at what intensities do you most frequently exercise?

![Bar chart showing exercise frequency and intensity]

- Light Intensity [leisurely walking, mopping, vacuuming, golfing, etc]
- Moderate Intensity [brisk walking, slow bicycling, ballroom dancing, doubles tennis, etc]
- Vigorous Intensity [jogging/running, aerobic dancing, fast bicycling, swimming laps, etc]

3. Do you prefer to exercise alone or with a buddy?

![Pie chart showing exercise preference]

- Alone: 36
- With a buddy: 12
- No preference: 12
4. Do you enjoy and/or frequently play video games*? *Facebook and phone applications, such as Farmville and Angry Birds, are included within the term "video games".

5. What are your favorite video game genres? Many games overlap in genre; select all genres that apply to your favorite games.
### Favorite Video Game Genres: Males

- Facebook and/or phone applications: 36%
- Puzzle (ex. Legend of Zelda): 39%
- Other: 18%
- Sims (ex. Sim City): 18%
- RPG (ex. Skyrim): 57%
- Fighting (ex. Super Smash Brothers): 25%
- First Person Shooter or Third Person Shooter: 68%

### Favorite Video Game Genres: Females

- Facebook and/or phone applications: 50%
- Puzzle (ex. Legend of Zelda): 71%
- Other: 21%
- Sims (ex. Sim City): 33%
- RPG (ex. Skyrim): 33%
- Fighting (ex. Super Smash Brothers): 13%
- First Person Shooter or Third Person Shooter: 42%
6. If you selected other, what are your other favorite video game genres?

<table>
<thead>
<tr>
<th>Text Response</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dance Games</td>
</tr>
<tr>
<td>mmo(massive multiplayer online)</td>
</tr>
<tr>
<td>Strategic simulations</td>
</tr>
<tr>
<td>horror</td>
</tr>
<tr>
<td>visual novels</td>
</tr>
<tr>
<td>JRPG, Action, Adventure</td>
</tr>
<tr>
<td>mmorpg</td>
</tr>
<tr>
<td>dance</td>
</tr>
<tr>
<td>adventure</td>
</tr>
<tr>
<td>puzzles, arcade</td>
</tr>
</tbody>
</table>

7. Do you prefer to play video games alone or with a buddy? (Buddy can be in person or through an online connection.)

![Pie chart showing preferences]

- Alone: 26
- With a buddy: 17
- No preference: 9
8. Have you ever exergamed* before? *Exergames are video games that are also a form of physical activity and exercise (i.e. Just Dance, Wii Sports, Dance Dance Revolution, Kinect Zumba)
9. What exergame(s) have you played?

<table>
<thead>
<tr>
<th>Text Response</th>
</tr>
</thead>
<tbody>
<tr>
<td>tennis</td>
</tr>
<tr>
<td>Dance Dance Revolution</td>
</tr>
<tr>
<td>Just Dance for Wii  Wii Fit</td>
</tr>
<tr>
<td>wii bowling , baseball</td>
</tr>
<tr>
<td>Wii dance and sports</td>
</tr>
<tr>
<td>Just Dance</td>
</tr>
<tr>
<td>Dance Central, Dance Central 2, Dance Central 3, Just Dance, Hip Hop Experience</td>
</tr>
<tr>
<td>Wii Sports</td>
</tr>
<tr>
<td>wii Just Dance</td>
</tr>
<tr>
<td>dancing on the wii  bowling on wii</td>
</tr>
<tr>
<td>zumba fitness world party</td>
</tr>
<tr>
<td>wii sports</td>
</tr>
<tr>
<td>Wii Fit, Wii Sports.</td>
</tr>
<tr>
<td>Wii games</td>
</tr>
<tr>
<td>Dance Central</td>
</tr>
<tr>
<td>Wii Fit, EA Sports Active 2</td>
</tr>
<tr>
<td>Wii Sports, Just Dance, Dance Dance Revolution</td>
</tr>
<tr>
<td>just dance</td>
</tr>
<tr>
<td>Wii fit</td>
</tr>
<tr>
<td>Wii Fit Plus</td>
</tr>
<tr>
<td>Just Dance</td>
</tr>
<tr>
<td>Dance central 1 2 3, Dance Dance Revolution. Wii Fit</td>
</tr>
<tr>
<td>justdance</td>
</tr>
<tr>
<td>--------------------</td>
</tr>
<tr>
<td>Wii Sports Resort</td>
</tr>
<tr>
<td>Just Wii Sports, Wii Fit</td>
</tr>
<tr>
<td>DDR, Wii Tennis</td>
</tr>
<tr>
<td>Just Dance 2013  Wii Sports  Dance Dance Revolution</td>
</tr>
<tr>
<td>Nintendo Wii system</td>
</tr>
<tr>
<td>Wii games, cardio-related</td>
</tr>
<tr>
<td>Tennis</td>
</tr>
<tr>
<td>WII Fitness, WII Tennis, Virtua Tennis</td>
</tr>
<tr>
<td>WII BOWLING</td>
</tr>
<tr>
<td>Just Dance, Wii Fit</td>
</tr>
<tr>
<td>Just dance and Dance Dance Revolution</td>
</tr>
<tr>
<td>just dance, dance central, zumba</td>
</tr>
<tr>
<td>WII Sports</td>
</tr>
<tr>
<td>Wii Fit, Wii Bowling</td>
</tr>
<tr>
<td>dance dance revolution</td>
</tr>
<tr>
<td>wii sports, wii fit</td>
</tr>
<tr>
<td>Wii Sports</td>
</tr>
<tr>
<td>Just Dance, Wii Sports</td>
</tr>
</tbody>
</table>
10. Please rate the overall quality of your best (or only) exergame experience.

![Bar chart showing the number of participants rating their exergame experience.]

**Mean Exergame Aspect Quality**

- **How vigorous was the activity?**
  - Not At All: 2
  - Slightly: 10
  - Moderately: 25
  - Very: 6
  - Total: 43 responses

- **How entertained were you?**
  - Not At All: 2
  - Slightly: 9
  - Moderately: 21
  - Very: 13
  - Total: 43 responses
### 11. Why have you never exergamed before?

<table>
<thead>
<tr>
<th>Text Response</th>
</tr>
</thead>
<tbody>
<tr>
<td>Never had the opportunity</td>
</tr>
<tr>
<td>I've never even heard of the term &quot;Exergame&quot;.</td>
</tr>
<tr>
<td>Because they actually make you physically tiring.</td>
</tr>
<tr>
<td>They do not interest me.</td>
</tr>
<tr>
<td>I feel embarrassed, also there's not much space in my tiny bedroom.</td>
</tr>
<tr>
<td>Never had the opportunity</td>
</tr>
<tr>
<td>they dont intrest me.</td>
</tr>
<tr>
<td>I have no money to purchase a console in order to participate, I prefer to play games that are free, which does not include exergames.</td>
</tr>
<tr>
<td>Not interested</td>
</tr>
<tr>
<td>I've never heard of it</td>
</tr>
<tr>
<td>because I exercise normally</td>
</tr>
<tr>
<td>they dont appeal to me and i dont have the space</td>
</tr>
<tr>
<td>Did not want to spend the money for the game</td>
</tr>
<tr>
<td>I don't own a video game system. I would consider it though.</td>
</tr>
<tr>
<td>We don't really have the equipment to do it. My sister and brother-in-law do, and it's tempting, but I'm not sure I'm ready to buy the equipment.</td>
</tr>
<tr>
<td>I don't have those type of games</td>
</tr>
<tr>
<td>We don't have that kind of device, only computers.</td>
</tr>
</tbody>
</table>
12. Have you been paying attention?

<table>
<thead>
<tr>
<th>#</th>
<th>Answer</th>
<th>Response</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Yes</td>
<td>60</td>
<td>100%</td>
</tr>
<tr>
<td>2</td>
<td>No</td>
<td>0</td>
<td>0%</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>60</td>
<td>100%</td>
</tr>
</tbody>
</table>
13. Under what circumstances would you choose exergaming over traditional exercise?

<table>
<thead>
<tr>
<th>Text Response</th>
</tr>
</thead>
<tbody>
<tr>
<td>when I am bored with my regular exercises</td>
</tr>
<tr>
<td>If it could be used in a private setting</td>
</tr>
<tr>
<td>In the winter when the weather is nasty outside. Or whenever the weather was bad.</td>
</tr>
<tr>
<td>If they are popular and fun.</td>
</tr>
<tr>
<td>none that I can think of</td>
</tr>
<tr>
<td>Almost all circumstances. I can excergame with my daughter and we laugh and have fun. It never gets boring and we can compete at the same time!</td>
</tr>
<tr>
<td>its about fun and entertainment and normally involves group activity making it seem more like fun gaming then exercise</td>
</tr>
<tr>
<td>if it were raining or I was not looking for serious exercise</td>
</tr>
<tr>
<td>In a party atmosphere</td>
</tr>
<tr>
<td>To change up my routine.</td>
</tr>
<tr>
<td>If I had no means to leave my residence ever.</td>
</tr>
<tr>
<td>A lot more fun</td>
</tr>
<tr>
<td>If I was alone or maybe if its cold outside.</td>
</tr>
<tr>
<td>I like reaching specific goals when playing games. If achieving a certain standard opened new levels it might keep my interest.</td>
</tr>
<tr>
<td>If it was available to me.</td>
</tr>
<tr>
<td>If I was just looking to have fun and not focusing on the workout</td>
</tr>
<tr>
<td>In the winter rather stay home than go to the gym</td>
</tr>
<tr>
<td>When I am with friends.</td>
</tr>
<tr>
<td>bad weather when I couldn't get outside to run or bike</td>
</tr>
</tbody>
</table>
Exergaming (Wii Fit) happens to be my choice for doing exercise. I can't stand the boredom of traditional exercise programs and videos.

If it were cheaper.

if it was a proven fact that you can lose a lot of weight doing them

Only during a party with friends.

When the weather is too bad to go to the park.

I would never because I can control my pace better with traditional exercise. I also do not strain my eyes.

With a group of people when our intentions weren't to get a good workout but entertain ourselves instead.

I wouldn't.

If I couldn't get to the gym, if my kids were home and I couldn't leave.

If it is fun and doesn't seem like exercise but your body is getting a good workout.

Weather is bad. They are more fun

Too cold or rainy to get outside

if its the only game or im tired or bored of the other games

When I want to play a game but conditions prevent me from really exercising

never

After my experience with the Wii, never.

I wouldn't, I prefer old fashioned exercise

never

I would much prefer to be outside, but I suppose if it was really cold or if I did not have transportation to the gym.

When the exercise involved was present due to being incorporated into the game in a fun and practical
way, such as when I run, my character runs or something similar.

Whenever I feeling like moving and it is too hot, cold, or raining outside

if i was at a gaming party or friends house

If I could try it at home for free

When needing to work out

if the weather outside was harsh or if the neighborhood I lived in wasn't safe

If the price of the equipment was good and the game was fun.

Bad weather

To change up my routine or bad weather

NOT MANY

When it is very cold outside

If the weather outside was bad, I would probably just stay inside and exergame.

with a group of people for the competition

To lose weight

I would choose exergaming when the weather outside was bad. I would also make this choice when I have limited time for exercising.

if somebody really really really wanted me to play with them

if the weather was bad, I would choose exergaming

None currently. Possibly if exergaming consisted of workouts similar to something like p90x, etc.

Mainly if it would allow me to get the exercise I need, avoid boredom doing it, and save the cost of the gym membership.

I would choose exergaming over traditional exercise if I had the system to play the games

In groups of people for fun

If I could afford it, it it was at a low or adjustable level, if it did not hurt my joints, if it was interesting
or motivating, if I like the sound track or music or could add my own (very important), if it did have a positive physical effect. There are probably more expectations...

<table>
<thead>
<tr>
<th>Statistic</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Responses</td>
<td>60</td>
</tr>
</tbody>
</table>

**Exergaming Advantages over Traditional Exercise**

<table>
<thead>
<tr>
<th>Advantage</th>
<th>Number of Participants</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bad weather or cannot leave home</td>
<td>32%</td>
</tr>
<tr>
<td>Game is fun/entertaining</td>
<td>18%</td>
</tr>
<tr>
<td>Social situations</td>
<td>13%</td>
</tr>
<tr>
<td>Never</td>
<td>17%</td>
</tr>
<tr>
<td>Always/almost always</td>
<td>8%</td>
</tr>
<tr>
<td>Affordable</td>
<td>8%</td>
</tr>
<tr>
<td>Provides good workout/helps lose</td>
<td>5%</td>
</tr>
<tr>
<td>Affordable</td>
<td>8%</td>
</tr>
<tr>
<td>Alone/private setting</td>
<td>3%</td>
</tr>
<tr>
<td>Not looking for serious exercise</td>
<td>5%</td>
</tr>
<tr>
<td>Change up workout routine</td>
<td>5%</td>
</tr>
<tr>
<td>Other</td>
<td>10%</td>
</tr>
</tbody>
</table>
14. Please rate the importance of the following exergame attributes.

- Exergame is entertaining/relevant to user's interests
- Exergame provides user with a vigorous workout
- Exergame includes a social and/or multiplayer aspect

### Mean Exergame Attribute Importance

<table>
<thead>
<tr>
<th>Attribute</th>
<th>Importance Levels</th>
<th>Responses</th>
</tr>
</thead>
<tbody>
<tr>
<td>Social/multiplayer aspect</td>
<td>Unimportant</td>
<td>59</td>
</tr>
<tr>
<td></td>
<td>Slightly Important</td>
<td>59</td>
</tr>
<tr>
<td></td>
<td>Moderately Important</td>
<td>59</td>
</tr>
<tr>
<td></td>
<td>Very Important</td>
<td>59</td>
</tr>
<tr>
<td>Vigorous workout</td>
<td>Unimportant</td>
<td>59</td>
</tr>
<tr>
<td></td>
<td>Slightly Important</td>
<td>59</td>
</tr>
<tr>
<td></td>
<td>Moderately Important</td>
<td>59</td>
</tr>
<tr>
<td></td>
<td>Very Important</td>
<td>59</td>
</tr>
<tr>
<td>Entertaining</td>
<td>Unimportant</td>
<td>59</td>
</tr>
<tr>
<td></td>
<td>Slightly Important</td>
<td>59</td>
</tr>
<tr>
<td></td>
<td>Moderately Important</td>
<td>59</td>
</tr>
<tr>
<td></td>
<td>Very Important</td>
<td>59</td>
</tr>
</tbody>
</table>
15. If you were to begin exergaming on a regular basis, would exergaming more frequently replace traditional exercise or sedentary behavior in your schedule?

![Pie chart showing responses to the question.]

16. What sex are you?

![Pie chart showing the distribution of male and female responses.]

- Male: 30
- Female: 30
17. What is your race/ethnicity?

18. If other, please specify your ethnicity:

Text Response

Multiethnic
19. Are you a parent?
BIBLIOGRAPHY


Centers for Disease Control and Prevention. "How Much Physical Activity Do Adults Need?"


ACADEMIC VITA

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Education

Bachelor of Science Degree in Information Sciences and Technology
Pennsylvania State University, Spring 2014
Honors in Information Sciences and Technology
Thesis Title: Should the Exergaming Industry Target Adults? An Exploratory Survey
Thesis Supervisor: Dr. Madhu Reddy

Professional Experience

Senior Student Tech Intern for Lockheed Martin
User Acceptance Testing Lead for LMLaunch application
Supervisors: Susan Ross, Chris Keohane
Summer 2013

Student Tech Intern for Lockheed Martin
Supervisors: John Messina, Susan Ross
Summer 2012

Relevant Academic Work

IST 413 Usability Engineering: Included study of research methods.
IST 431 The Information Environment: Included detailed research on virtual and augmented realities.
IST 489H Research Methods for the Information Sciences and Technology

Awards

Dean’s List (Fall ’10, Spring ’11, Fall ’11, Spring ’12, Fall ’12, Spring ’13)