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Pepperdine University  
Graduate School of Education & Psychology

ACTIVE GAMES: AN EXAMINATION OF USER ENGAGEMENT TO  
DEFINE DESIGN RECOMMENDATIONS

A dissertation submitted in partial satisfaction  
of the requirements for the degree of  
Doctor of Education in Learning Technologies

By  
Pamela N. Martinez

June, 2017

Linda Polin, Ph.D. – Dissertation Chairperson

This dissertation, written by

Pamela N. Martinez

under the guidance of a Faculty Committee and approved by its members, has been submitted to and accepted by the Graduate Faculty in partial fulfillment of the requirements for the degree of

DOCTOR OF EDUCATION

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## DEDICATION

To my sweet Kailey. You have been my inspiration since day one. Thank you for your patience, love, support and understanding through this entire process. May you always find peace and strength throughout your journeys. Always keep nature and adventure within your reach for balance and inspiration. I love you sweetheart.

To my parents and brother. This was all possible because of your unfailing love and support for us. Mom and dad thank you for always making our education a priority. Dad you set the bar high and I'm glad that I was finally able to reach it. Thank you all for your support.

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My chair, Dr. Linda Polin, you were the deciding factor upon which I chose to attend Pepperdine. Your knowledge and influence within gaming was and still is impressive. You afforded me opportunities to finish out my dissertation when all else in life was not cooperating. Your guidance and understanding will always be appreciated, thank you for helping me through.

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Dr. Barbara Chamberlin, my committee member, colleague and friend. There will never be enough words to express my gratitude. I will never be able to repay you for all the time and energy you spent with me during the dissertation process. I have learned so much from you. I will forever be indebted to you and will always do my best to return the kindness. Thank you for the compassion and understanding you have shown me throughout an unexpectedly difficult time in my life, which also just happen to coincide with the dissertation process.

Dr. Jeanne Gleason, my department head and mentor. You believed in the young eager woman who knew no better than to start a doctoral journey. You and Dr. Chamberlin inspire me. You two have been great professional influences in my life. From the bottom of my heart Jeanne,



thank you for everything you have afforded me. I will do my best to honor you and the department you started and cherish.

Dr. Lani Fraizer, professor and mentor, your support started back when we were both students. You mentored me through the doctoral program and steered me through precarious paths during the dissertation process. I can join you now for that trek across El Camino de Santiago. Thank you for believing in me Lani.

Amy Smith Muise, who edited various versions of my work, sometimes at a moment's notice, your input and suggestions were always helpful and invaluable. Thank you, Amy, for your continued assistance. Connie Padilla, my dear friend, thank you for everything you kept me going. Elizabeth Sohn, you've helped so much throughout the years, thank you for taking on just about anything. Michelle Garza, you made me laugh when laughter seemed to exist. Your stories and silliness got me through my loss, you constantly encouraged me, thank you. The last couple of years was especially tough for my studio group, I thank each and every one of you for your understanding. I've been fortunate to be surrounded by so many good people for which now I'll continue to pay it forward.

## VITA

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Creating Infographics & Presentations with Online Web Apps

NMSU Cooperative Extension Service 2010  
Twitter, Facebook & Blogging: How to Use Them in Extension

Games-Learning-Society, Madison, Wisconsin, 2008  
Science Pirates: The Curse of Captain Brownbeard

Games for Health, Baltimore, Maryland, 2008  
CYFAR meets Exergaming: The launch of a USDA granted anti-obesity research project

ACE International Conference, Albuquerque, New Mexico 2007  
Building Resources for First-Generation and Culturally-Identified Hispanic Students  
iTunes @ New Mexico State University

CYFAR Conference, Children, Youth, and Families at Risk Program. Illinois 2007  
Obesity Prevention Through Games: Overview of Exergames and How to Use Them

NMSU Teaching Academy 2006  
Building Resources for Maximum Achievement and Retention of Minority Students

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Eat and Move-O-Matic. App. (2015)  
CT Fans. University of Connecticut (2014)  
Virtual Science Labs Simulations. NMSU Learning Games Lab. (2014)  
Math Snacks Algebra. NMSU Learning Games Lab. (2013, 2011)  
Don't Be Gross Animations. NMSU Learning Games Lab. (2011)  
Exergames Unlocked Website. [exergamesunlocked.com](http://exergamesunlocked.com) (2011)  
Treadsylvania ATV Safety Game. NMSU Learning Games Lab. (2011)  
Science Pirates: The Curse of Brownbeard, NMSU Learning Games. (2009)  
Chinese Food Safety: NMSU Learning Games Lab. [chinesefoodsafety.com](http://chinesefoodsafety.com) (2008)  
Building Resources for Retention and Maximum Achievement of First-Generation and  
Culturally Identified Hispanic Agricultural Students. NMSU Learning Games Lab.  
(2007)  
Eat, Move, Learn: An Exploration of Energy Balance. NMSU Learning Games. (2007)  
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## ABSTRACT

Active gaming is a form of video gaming that requires full body motion or varying degrees of physical activity to play a game. While active gaming has gained momentum, there is a lack of studies that provide insight on how they should be designed, specifically components of active games make them engaging. This study identifies, analyzes and categorizes specific design mechanics and features used in active games. It answers the question: Which, if any, game mechanics and features can a panel of experts in academia, health and the game industry agree on as valuable and impactful to the construction of successful and engaging active games? Using a Delphi study, nine experts answered questions related to active gaming. They reached agreement on 20 of the 21 inquiries regarding game design focused on motivation, social influences and flow. Their feedback offers recommendations on the design of future active games, and identifies emerging trends. This study shares their notes, and translates the findings into specific recommendations for developers on the design of active games.

## Chapter 1: Introduction

### Overview

Obesity rates among children in the U.S. have tripled since 1980: currently 32% of children in the U.S. are overweight or obese (Entertainment Software Association [ESA], 2011; Levi, Segal, St. Laurent, & Winter, 2010; Park, Yoo, Choe, Park, & Song, 2012). Expanding health care costs, chronic diseases and threats to national security are concerning for policy makers, health professionals and researchers. Obesity is higher in groups with lower socioeconomic status and education levels and is prevalent in Southern U.S. states, mainly within minority groups; yet it affects all states and ethnicities to varying degrees (Levi et al., 2010). Media consumption, such as television and video games, are among the factors continually blamed for increasing obesity rates because of their roles in displacing physical activity and facilitating sedentariness among youth (Vandewater, Shim, & Caplovitz, 2004). Yet, video games may also be an answer to getting this generation of sedentary youths moving again.

Researchers have been investigating the health benefits and potential of video games, specifically *active games* and *exergames*, (Haddock, Siegel, & Wilkin, 2010; Lieberman, 2006). The White House Task Force for Obesity, along with Michelle Obama's *Let's Move* initiative and the Apps for Health Kids campaign, aimed to decrease obesity rates, increase physical activity and promote health awareness (Levi et al., 2010). It serves as a good indicator that public policy makers are noticing the potential benefits that movement-based video games can provide is through the creation of the Apps for Healthy Kids campaign, is aimed at reaching a new generation of technology users to increase physical activity and health awareness through video games. Serious game designers, researchers and policy makers view games as a means to create social impact, since games can be explicitly designed to improve quality of life by addressing

issues such as economics, the environment and health (McGonigal, 2011; Montalbano, 2011; Squire Steinkuehler, 2011). Often, game play results directly show impact on real life by creating positive behavioral change (Barab & Squire, 2004; Elkind, 2008; McGonigal, 2011).

Consumer spending on the video game industry totaled nearly 25 billion in 2011 (Entertainment Software Association, 2012). Increased consumer interests in electronic media and newer motion-based gaming technologies could potentially change the perception that video gaming largely accounts for higher obesity rates, as gaming is becoming more physically engaging. Video games – whether computer, web, portable or game consoles – are played by 97% of teen's ages 12-17 (Evans et al., 2008). The Entertainment Software Association reports that 72% of American households play video games (Entertainment Software Association, 2011). Parents are recognizing positive impacts from gaming, benefits such as mental stimulation, increase in family time together and social connections with friends (Entertainment Software Association, 2011). With more than half of American households playing video games it is conceivable to extend outreach beyond families to schools, after-school programs, community centers and other social groups to enhance physical activity and learning through video games.

Gaming technologies such as Nintendo Wii, Xbox Kinect and the Sony PlayStation Move require the player to be physically active while playing a video game. These now ship standard on game machines. Because of this physical involvement, the games are noted as possible tools to combat the obesity epidemic and help mitigate the decline of physical activity. While movement-based games have been around since the 1980s, exergame design picked up speed at the end of the decade, moving away from the earlier style of active gaming that was limited to arcade games (Bogost, 2005). The influence of this earlier suite of games incorporating exercise

can be seen in parallel games and systems seen today, such as *Dance Dance Revolution* [DDR] and the Atari 2600® *Foot Craz*, DDR and the Nintendo Entertainment System® [NES] Power Pad, and the WiiFit® and Amiga®. Originally the games were generally track or other types of running sports (Bogost, 2005). With the development of the Nintendo Wii® and Wiimote and new accelerometer technology, the option of game types has expanded to include motion-based engagement where the player controls their character or movements using a free ranging remote rather than traditional hand held controllers. Newer systems, such as PlayStation Move and Xbox Kinect, have created even more engaging and realistic experiences using similar or newer technology that does not require a remote, but is motion-sensor based.

Popular dance games like *Dance, Dance Revolution* [DDR] and *Dance Central*, where the player is actively engaged in following a series of computer-generated dance steps, were implemented into school programs across the United States with impressive results. An elementary school in New Mexico showed a decrease in tardiness when *Just Dance* was implemented at the start of the school day (Hellmich, 2011). When the state of West Virginia placed DDR units in the majority of their schools, students showed improved blood pressure, fitness scores and better oxygen flow, as well as increased participation in other activities for some children (Hellmich, 2011; Schiesel, 2007).

This type of motion-based or physical activity–enhanced video game playing is known as active gaming. Active gaming is a form of video gaming that requires full body motion or varying degrees of physical activity to play a game. Research documents several impacts of active games, but provides few recommendations on how to make them engaging. There is plenty of research on traditional game play, but there is a need to examine how concepts of fun can be applied to the exergaming fields (Sinclair, Hingston, & Masek, 2007). Some games have

impact, but more needs to be done to isolate what characteristics lead to well-designed games active games.

### **Purpose Statement**

The purpose of this study is to identify, analyze and categorize specific design mechanics and features used in active games to encourage engagement in users. This study should be able to address the following research.

### **Research Question**

Which, if any, game mechanics and features can a panel of experts in academia, health and the game industry agree on as valuable and impactful to the construction of successful and engaging active games?



## **Chapter 2: Literature Review**

This chapter reviews theoretical perspectives of play and games, considers active gaming as a subset of video games and explores existing game design and how it may lend itself to active game design. The potential impact of active games is evaluated through literature on play and development, gaming and games, exercise and health, and motivation.

### **Value of Play and Games**

Play and games are of importance to human development because they impact learning and society in ways that most people fail to observe. Many people see them as idle pastimes or frivolous activity. While their value is not always apparent, both play and games do provide meaningful and beneficial unstructured learning that often occurs naturally. Play is crucial to healthy physical, intellectual and social-emotional development for all ages (Elkind, 2007). Play engages creativity; it involves imagination, curiosity and fantasy (Elkind, 2008; Gee, 2008a). It is regarded as a natural human tendency that evolves into complex thinking and a higher level of learning during the different stages of human development and growth (Caillois, 2001; Dewey, 1997; Elkind, 2007; Huizinga, 1967; McGonigal, 2011; Sutton-Smith, 1997; Vygotsky, 1978). Some theorists categorize play into different play forms or subsets: such as contests, sports, art, theater, hobbies, imaginary play and games (Caillois, 2001; Huizinga, 1967; Sutton-Smith, 1997).

Games are what children engage in the most, in terms of type of play, whether they are self-created games or predefined games. Younger children tend to engage first in imaginary play, then self-created games and as they grow they start engaging in game play that is more defined and with expected outcomes (Caillois, 2001; Elkind, 2007; Huizinga, 1967; Koster, 2005; Sutton-Smith, 1997). Games have been described as formal systems, escapes from reality,

contests, possible conflicts, sets of rules and outcomes controlled by the efforts of voluntary players (Caillois, 2001; Crawford, 2003; Elkind, 2008; Huizinga, 1967; Koster, 2005; Salen & Zimmerman, 2006; Sutton-Smith, 1997).

Active video games may fill a void created by less opportunities for physical activity. Outside recreational play has been lost for many children due in part to built environment changes, unsafe play areas and less freedom to explore (Datar, Nicosia, & Shier, 2013). Counties and neighborhoods have in the last two decades been built to accommodate more traffic and county sprawl, which has led to the spreading out of some areas and compactness – building up – in others, resulting in inaccessible roads, fewer sidewalks and less green area for activity (Ewing, Meakins, Hamidi, & Nelson, 2014). Household demographics factor in as well; single parent families and families with both parents employed and children raised by elderly relatives have led to safety concerns over unsupervised outdoor play. This, along with general change in social mores around supervision of children, results in more indoor activity. Additionally, with - increased standardized tests and academic competition, many schools have foregone physical education programs or have shortened free play or recess in favor of more instruction time (Elkind, 2007; Manning & Witherspoon, 2012; Pellegrini, 2008). This increased emphasis on schoolwork has also affected unstructured time outside of school via more homework, after-school tutoring and organized extracurricular activities (Elkind, 2008).

Society has adjusted to these occurrences, and the result is that technology-based environments have in large part taken over physical play spaces like playgrounds and parks. There has been a significant increase in sedentary time, as technology and media delivery has become more readily available (Rideout, Foehr, & Roberts, 2010). Kids are spending more time indoors, engaging with technology such as mobile phones, tablets, computers, game consoles and

television (p. 1). Media consumption by 8- to 18-year-olds has increased by 1.5 hours daily within the last five years; as of 2010 they spend 7.5 hours each day engaging in some type of media (p. 2). The Kaiser report refers to media consumption as types of entertainment activities, for example, computer games, Internet videos, social media, movies (in the theatre), TV viewing during regularly scheduled programming and video games (p. 2). Youth ages 8-18 [60%] play games, whether handheld or console-based, about two hours on any given day (p. 23). This data indicates the significance of technology for youth today, identifying an opportunity to design games and apps for healthier lifestyles.

There is increasing interest in gaming products as a form of physical activity, especially given all of the health risks of leading a sedentary lifestyle. Research into the serious games industry is expanding. Current research in the games for health genre is enabling us to better understand the benefits of active gaming. Health-related games often incorporate real-life actions or situations to achieve the set goals, which is also a main objective of serious games.

### **Serious Games**

Serious games are and have been becoming increasingly significant to the gaming industry. The term *serious games* was originally coined by Clark Abt, a United States researcher in the Cold War era who created military training games (Djaouti, Alvarez, Jessel, & Rampnoux, 2011). The demand to inform people about issues and content of a more serious nature fostered terms like *edutainment* and *games to teach* in the 1990s. In 2002, the idea of serious games was reintroduced with the Serious Games Initiative, co-founded by David Rejeski of Woodrow Wilson Center in Washington D.C. and game developer Ben Sawyer. This then led to the Games for Health and Serious Games Summit (Digitalmill, n.d.; Djaouti et al., 2011). In 2011, the Office of Science and Technology Policy at the White House began analyzing video games and

learning related to topics such as obesity and STEM [Science, Technology, Engineering and Math Education] (Squire Steinkuehler, 2011).

Serious games today continue to merge into commercial gaming and corporate industries, for example defense, education, business, banking, science, health care, religion and politics (Sawyer & Smith, 2008). Serious games were once primarily targeted and intentionally designed educational materials that were incorporated into gaming environments. This is no longer necessarily the case, though many commercial games today cross over into serious games. As these types of games are becoming more sophisticated and readily available, industries such as health, military and education are able to tap into commercial entertainment games for the purpose of conceptual education, military simulations, physical therapy, as well as health and medical professional training.

Most studies in the area of active gaming have been under the auspices of health-related issues such as obesity prevention, psychosocial semantics (interpretation and reactions to social situations) physical rehabilitation and physical education (Lieberman, 2006). Additionally, medical communities and health industries have been successfully incorporating commercial games and peripherals into their practices. Many were early adopters of the Wii and Wii Fit because the systems' support for motion-based play thus increasing physical activity. Nintendo developed the Wii Fit not long after the Wii was introduced in response to the fitness interest generated by the Wii. Games like *Jillian Michaels: Fitness Ultimatum 2011*, *Biggest Loser* and *Zumba*, have since been introduced into the gaming world. As the obesity epidemic continues to widen and affect children and adolescents on into adulthood, if not controlled early, there will be much younger populations with life-threatening diseases.

### **Active Games**

To understand active games as a subset of video games, a clearer description of *active* is needed. In a video game, the active component is not necessarily obvious. Most video games, by design, encourage sedentary screen time with hand controllers via finger manipulation, while active video gaming requires various ranges of physical activity to play a game using built-in motion sensor technology.

**Descriptors of active games.** There are inconsistencies with the terminology used to describe the phenomenon of physical action as part of video game play – active gaming – when associated with physical activity or fitness. Exertainment, exertion gaming, exergaming, active video gaming, and interactive video gaming are among the many terms used by game developers, researchers, and medical professionals to describe the phenomenon of active gaming. There is more variation in the terminology utilized in health-related research than in non-health related. Non-health-related fields seem to prefer the term *exergames* and describe it as combining exercise and videogames (Oh & Yang, 2010).

Sinclair et al. (2007) make yet another distinction that an exergame is a video game combined with exercise equipment, for example, a game bike (stationary bike) retrofitted specifically for gaming. Researchers at University of South Florida prefer the term active gaming, but then categorize it further: Exergames, Interactive Fitness Activities and Active Learning Games (Hansen & Sanders, 2011). From a games and learning perspective it is difficult to agree completely with their categorization and titles, as will be discussed more thoroughly later in the chapter.

To further clarify, some researchers in health-related fields are concerned with the rate of perceived exertion (RPE), in which an exercise program must consider the combination of duration, intensity and frequency (Sinclair et al., 2007). The RPE is a scale in which the person

rates how hard they are physically working (p. 4). Some game players do not reach high enough RPE through gaming for the physical activity to be considered legitimate exercise (p. 291). Therefore, perceived exertion could be a factor in clarifying the difference between the two most common terms, active gaming and exergaming.

For the purposes of this project, *active gaming* will be considered the standard term for all the different types of motion-based video games that require physical activity. It encompasses the range of activity-enhanced gaming identifiers, including exergames, which is considered a subset of active games in Hansen and Sanders' research (Hansen & Sanders, 2011). The less arguable issue is that active gaming does increase physical activity, and the longer one plays in moderate to high intensity the better the health benefit. It helps establish positive outcomes, whether they be physical, psychosocial, cognitive or academic (Staiano & Calvert, 2011).

**Active gaming examples.** Video games that unintentionally engage participants in physical activity are significantly different from games that explicitly seek to engage participants in physical activity. While both are activity-enhanced, the difference between fitness video games and non-exercise specific video games is important because fitness based games like EA Sports Active are designed for physical workouts, while non-exercise specific games like Dance Central are designed as games, with play as their main objective. Additionally, fitness games and applications are not always fun, even though they may appear to be, and similar to regular exercise can be perceived as a chore; therefore, it can be difficult to form the favorable habits necessary to reap any benefits (Campbell, Fogarty, & Ngo, 2008).

With this in mind, it is important to honestly confront the fact that, while exergaming or fitness-based gaming can sometimes appear to be fun, the player needs high levels of intrinsic motivation to sustain the activity. Health games researcher Debra Lieberman (2006) found that

her study participants played the arcade version of *Dance Dance Revolution* (DDR) an average of 4 hours per week. Some participants played both the arcade and the console version, and they spent an average of 7.4 hours per week – 5.6 hours on console and 1.8 hours in arcade (p. 2). Participant responses, in ascending order regarding DDR preferences, were as follows: to be admired by others (skill level), challenge, meet other DDR players, dance, work out, play with other people and, most importantly, to have fun (Lieberman, 2006). DDR players have also constructed various communities on the web, high school clubs, college meet-ups and tournaments (p. 2). These players were intrinsically motivated by fun. Researchers are looking at how these game elements can carry over to other games, or game-like environments, as well as the real activities. The article revealed that game design elements such as setting goals, creating mental and physical challenges, plus being socially rewarded, prepared the player for fun and engaging workouts.

A study conducted with fourteen children examined child preference for active media to sedentary activities. Children could choose sedentary activity (reading, drawing or coloring), or would substitute for media consumption via TV, VCR or video games accessed only by riding a stationary bike that controlled the media directly. The children in the contingent increased their physical activity by continuously pedaling in order to gain access to the television activities rather than engaging in the sedentary activities (Epstein & Saelens, 1998). The study showed that kids are willing to engage in physical exertion to play video games and watch television. Media access has become an emotional motivator to a generation that has grown up with technology as an outlet for entertainment, enjoyment and social engagement. These findings lead to questions about what kind of potential and results active games have to offer.

**Potential of active games in obesity.** Video games that are not explicitly fitness-based

allow for escapism to the point where the player may not interpret the actions as exercise and be more likely to willingly engage in gameplay. Traditional game design has been successful in establishing a form of escapism where the player is so engulfed in gameplay that they become fully immersed; they are in a zone of heightened engagement. Players want to become absorbed, and this can be viewed as a positive outcome when examining the benefits of active games (Jin, 2009). Virtual environments may seem new, because they are an augmented reality many people are unaccustomed to, but the essence behind them is merely a more literal landscape of the imagination that plays on people's emotions, similar to books or storytelling only with more vividness (Biocca & Levy, 1995).

Linguistics researcher James Paul Gee studies immersive video games such as *Half-Life*, *Age of Mythology* and Tony Hawk's *Pro Skater*, where environments, characters and gameplay can be manipulated by the player, thus empowering the player with significant decision making (Gee, 2003, 2008b). The role-player or individual playing the game takes on a new identity associated with the game and brings with them knowledge of the real-self (Gee, 2003, 2008b). They then evoke their own real-life experiences, emotions, values, beliefs, attitudes and such, while making decisions for the game character (Gee, 2003). Players do not disconnect from reality while playing games; they are merely absorbed in the creation and experimentation of new roles and experiences within digital spaces. These are valuable experiences that can then be transferred back to the individual as they navigate through real, everyday experiences. Game designers are exhorted to be mindful that the activity must be captivating and fun to ensure frequency and duration of use (Sinclair et al., 2007). This can be accomplished during the construction of the game.

If *fun* and *captivating* are key game characteristics to encourage frequency and duration



of use, then there is a need to know how to design for such elements in active games. It is no longer is about games played in a sedentary position with a controller. Physical activity must now function as a form of physical realism that compliments video games to engage players. Active games require different design and development perspectives, as the gaming experience involves partial to full range physical activity to control game play. Video gaming is a growing industry and understanding how active gaming differentiates from classic video game play is important to the design of tomorrow's games.

Newer technologies allow for motion-based interaction, meaning that the new systems come with 3-D accelerometer and gyroscope motion-sensing capabilities. The Xbox Kinect uses skeletal joint tracking technology for users to move without a remote. Consoles like the Wii and PlayStation Move have vibration sensing in the remotes and use Bluetooth or LED technology to track the user. The systems allow for play space ranges from about 2ft to approximately 13ft and varying degrees for the field of view. The following section will review traditional game design and its transferability to active game design.

The earlier categorizations from Hansen and Sanders place non-screen-based active gaming into an interactive gaming section, but in reality, all games are interactive. Hansen and Sanders' (2011) category of Active Learning describes an active game paired with an educational game as active learning that is used in classrooms and not as physical education (p. 124). The researchers are creating a category of learning that happens when learners are being physically active while using an educational game. Hansen and Sanders' categorization does not appear to be based on the *pedagogical theory* of active learning, which is described as learning via experiential processes, cooperative learning and higher-order thinking tasks, to actively engage a participant in their own learning.

However, as a category title, active learning could easily be confused with active learning theory, especially since, from a theoretical perspective, the latter is also relevant to discussions of games and learning. Video games provide a space where the player is immersed in environments that allow for experiential learning. They are actively engaged in exploration, strategy negotiation, decision-making and establishing identities. Players are building their own knowledge and understanding through game play in safe environments. They are participating in *active learning* (in the pedagogical sense) whether they realize it or not. It does not matter if they are using standard game controllers or motion-based gaming, learning is still occurring. Quite often the engagement is effortless and enjoyable, which leads to research discussing motivation and engagement directly associated with video gaming.

### **Engagement Around Gaming**

Designers try to create games that are engaging and meaningful for players. In doing so it is important for designers to understand some of the underlying influences of how players relate to games, and how their experiences can be influenced cognitively, psychologically and emotionally (Salen & Zimmerman, 2006). Game mechanics and features are important factors associated with gameplay because they too directly influence motivation and various aspects of engagement; it is important for game designers to understand some of these underlying concepts (p. 4). Three key areas that influence traditional game design may also directly influence the design of active video games—motivation, social aspects of gaming and flow.

### **Motivation**

**Definition of motivation.** Motivation is what prompts people to do some sort of activity. In the gaming world, what motivates gamers to pick up a controller and play can be broken down many different ways with different reasoning as well. Some may even argue that when new

games or genres are created, new motivations for players are also created because there are different opportunities and new takeaways than what were previously offered (Ryan, Rigby, & Przybylski, 2006). There are various reasons that players stay motivated, such as satisfaction in achieving a goal or simply because they enjoy the activity and think it is fun.

Similar to having multiple genres that create various inspirations, people are different and have distinct preferences. Some players like the fact that they are able to socialize with others; some do it for the ability to carry out different actions; there are those that partake for the chance to achieve some goal, and others play in order to investigate the world and game itself (Ryan et al., 2006). There are gamers that play to find that immersive state that will separate them from their own world, giving them a break of sorts (p. 2). These are reasons that gamers are motivated to start playing. There are also reasons that the gamers are motivated to continue playing, specifically going back to the same game, because technically they could receive all of the before-mentioned yearnings with any game. To keep them returning to the same one, the game should have a few different aspects to it. It should allow people to feel that they are in some way linked with the other players. The players should feel as though they are part of the inner world of the game, not like they are simply watching what is happening from the outside, and they should feel as though they have some sort of control over what is taking place in the game, which also includes having controllers that work properly with the game, allowing them to do what they want to (p. 6).

**Motivation and learning.** When a player has a strong sense of motivation to continue on with a game, they will automatically learn more from the game than if he or she had decided to quit early on due to a lack of motivation, or engagement. For example, when a game has short-term goals set close together, a player will quickly catch on to what does and does not work to

complete them. The player will continuously change their approach as they learn the way that the game is responding (Park et al., 2012). The same thing will happen in relation to multiplayer games. When the players are forced to work together or against one another they will adapt their behavior to whatever strategy is either aiding in their and their partners' success or helping them defeat their opponent (p. 4).

**Motivation and gaming.** One of the advantages that motivation can add to gaming is increased engagement of the players (Berkovsky, Bhandari, Kimani, Colineau, & Paris, 2009). If specific details of the design elements, specifically mini goals, are executed correctly, there will also be an increased level of difficulty for every new goal that the player meets (Berkovsky et al., 2009). When the obstacles that the players face are hard, but still attainable, it motivates them to continue (Yim & Graham, 2007). With the continued game play, the player in turn becomes increasingly engaged with the game and its various aspects.

**Motivation and design.** Motivating players can be considered a top priority, especially in relation to exergames (Csikszentmihalyi, 1997). Motivation itself can be broken down into different building blocks, the first being goals. There should be short term goals strewn throughout the game in order to keep the players engaged and instill a feeling of accomplishing something, which will encourage them to stay motivated and continue playing (Yim & Graham, 2007). Another important aspect is that there should be adequate instruction within the game, besides just the manual that comes in the case. This is especially important for players who are new to the game and do not understand all of the components yet. With the help of a leader, whether that be through another character in the game or more experienced players, the newest player will feel more confident with their ability to continue on with the game (p. 6).

Motivation can also be linked to social play. Not only can multiplayer games, or

multiplayer options in games, keep participants playing for longer amounts of time, this also may be the factor that keeps their motivation at a level high enough to promote continued gaming (Osorio, Moffat, & Sykes, 2012). Along with this is the need for the game to make it fairly easy for players to find others to play with (Yim & Graham, 2007). Some people prefer to take part in games when there are multiple players: however, when it is a laborious process to connect with others it decreases the motivation of the player and may even deter them from playing to avoid isolation (p. 6).

### **Social Influences**

**Social instances.** Many adults, non-gamers and naysayers once considered gaming an antisocial activity. Video gaming, however, has become a very social activity in most regards. Players do not even have to leave home to be connected to people around the world, or next-door for that matter. Gaming has its own culture and subcultures. Some of the more widely known massive multiplayer online games, such as World of Warcraft and League of Legends, have enormous communities associated with them. Within active gaming this is not the case, except for DDR, which is somewhat dated, but had a large cult-like following where communities were developed on-line and in real life (Lieberman, 2006).

**Social and learning.** L. S. Vygotsky's (1978) sociocultural theory interprets *symbolic play* as a "complex system of speech through gestures that communicate and indicate the meaning of playthings" (p. 108). These gestures can translate to higher order thinking (Vygotsky, 1978), which is important to learning. When we relate this to gaming, we can identify with linguistics researcher James Gee (2003), who associates higher order thinking with what is produced within complex games by adapting and playing within virtual cultures. Additionally, Gee speaks to semiotic domains that gamers become a part of. One can associate semiotic

domains with communities of practice, as they are similar in context; they provide structured communities in which a person can become a participant.

**Social and games.** The sociability factor that many game players crave can be accomplished through various forms of online communities, teamwork, or competition (Suhonen, Vääätäjä, Virtanen, & Raisamo, 2008). Whichever process it comes by, players will find themselves more engaged in gameplay if they have had to interact with other players (Suhonen et al., 2008). In one instance when researchers observed their participants, they found that the most enjoyable part for them was having the option to socialize while they were playing the game (Mueller, Gibbs, & Vetere, 2010). Sociability adds a different atmosphere to the games, making the play multidimensional. Not only do the gamers have the challenge and action of the game, they also have people to interact with when reaching goals or becoming frustrated. Likewise, a direct link has been observed between the level of enjoyment and interest in exercising and being able to exercise with a group (Mueller et al., 2010). These two positive behaviors –socializing and working out – can work together, with a person actually improving both aspects at the same time.

**Social and design.** The amount of social interaction found within a game can be attributed to the game's design (Mueller et al., 2010). For this to feel worthwhile in a game, the actions required must be natural and relevant. For example, the game *Table Tennis for Three* keeps the most important movements associated with table tennis but adds the potential for additional, socially oriented motions into the game (Park et al., 2012). The act of the player moving his or her arm or wrist and adjusting the paddle would be the extent of what is needed to play the actual game and control what is happening. Any other action may aid in adding an individual twist to the different characters, but technically speaking would be unnecessary for the

game to be played. These unneeded actions, also referred to as non-primary actions, may be introduced unto the game; however, the new interaction should be presented in a way that will not keep the player from effectively carrying out the original required action (p. 2). In other words, any extra action should be minimal enough that the player can continue to focus on the main objective as well as interaction with other players.

Another aspect of making a game social is having the necessity of cooperation. As noted by Park et al. (2012), exercise, though enjoyable to some, is generally something that people do not want to do, but feel is needed. When the component of gaming is introduced to the act of exercising, it becomes less about the energy that is being expended and more about completing the challenge or reaching the short-term goal that is being presented. As far as social play goes within active games, it introduces yet another type of motivation for the gamers. Research suggests that adding competition to a mundane method of exercising increased participants' level of interest (p. 3). The urge to beat the competition, in whatever the activity, becomes the main objective, and the actual act of exercising becomes less concerning. A gamer's need to fit in and feel a part of a larger assemblage will grow in accordance with the number of players added. Players, not wanting to feel left out or disappoint their friends, will push themselves to work harder in the game, and if controls are directly linked to actions that take place in the game, they will automatically start exercising at a faster pace as well, most likely without even noticing.

However, should the level of exercise increases by the player to a dangerous level, there must be some design elements put in place that will cause them to slow down to avoid overexertion (Park et al., 2012). When the player is unable to reach the level of intensity they want, due to safety implementations and notifications given, they will most likely slow down their own physical motions, preventing them from unknowingly causing themselves harm (p. 4).

## Flow

**Definition of flow.** People are at their happiest when they are at their optimal level of concentration. It is a level of absorption so deep that the world around you seems to cease existing because you are in the state of *flow* – an effortless state of engagement (Csikszentmihalyi, 1997). This optimal state is a balance between skill and challenges: goals are set, feedback is immediate, action and awareness merge, self-consciousness disappears, time distorts and the act becomes automatic (Csikszentmihalyi, 1997, 2007). If a challenge is too difficult, a person will likely become anxious; should it be too easy, the person becomes bored, ultimately not obtaining focus. Examples of flow activities are games, knitting, mountain climbing, surgery, and computer programming, each of which allows a person to focus on clear compatible goals. In regards to flow and play, work by Csikszentmihalyi (1997) suggests U.S. teenagers experience flow about 13% of the time they spend watching television, 34% of time spent in hobbies, and 44% of the time they are involved in sports and games (p. 9). Flow-producing activities require an initial investment of attention before it begins to be enjoyable. Being too tired, anxious, or lacking discipline to overcome that initial obstacle, a person will settle for something that, although less enjoyable, is more accessible (Csikszentmihalyi, 1997).

**Flow and learning.** Flow is mostly recorded when a person is engaged in a favorite activity, for example, sports and hobbies, which usually fall into a leisure category (Csikszentmihalyi, 1997). Csikszentmihalyi (1997) suggests, “that leisure, according to Greek philosophers, is when humans allow time for self-development, learning, politics and the arts” (p. 13). The term leisure in Greek is *scholea* the root for the modern use of *school* (p. 13). Yet school, by modern standards, is far from the original ideal of leisure. It is when humans have nothing to do that their potential is recognized, and classrooms today are so structured that they



may not always allow for this deepened state of engagement. The closest people get today to leisure and unstructured learning is engaging in hobbies and sports. Flow acts as a magnet for learning, it develops into new levels of challenge and skill while inciting enjoyment (p. 33). Games are a gateway to learning. Even though they are recognized as leisurely activities, they have the potential to increase knowledge and create change.

**Flow and games.** Flow occurs more easily in games where there are goals and requirements – *forms of actions* – where the player acts without question (Csikszentmihalyi, 1997). Associated with sports and sometimes referred to as “being in the zone,” flow lends itself nicely to video games as well (Sinclair et al., 2007). Gamers describe a similar experience when immersed in games. They lose track of time and outside distractions (Chen, 2007). Flow has been observed in active video gaming when participants are physically engaged in movement-based gaming similar to exercising or sports (Sinclair et al., 2007). Video gaming allows gamers the opportunity to match their skills with challenges – they are creating flow experiences (Gregory, 2008).

**Flow and design.** Mihaly Csikszentmihaly’s Flow Theory, or an adaptation of it as it pertains to game design, is called GameFlow (Martinez, 2009). Gameflow is a modified version of Flow theory created by Sweetser and Wyeth specifically for game design to study player enjoyment (Sweetser & Wyeth, 2005). It has now also been associated with exergaming design in a smaller study (Sinclair et al., 2007).

**Design elements related to engagement.** Concentration is the first element of flow; all games should call for the gamers’ concentration. This also means that the game needs to allow them to focus their concentration on it (Sweetser & Wyeth, 2005). There should be limited distractions within the game that pull the gamer’s attention away from the task at hand; this will

not allow full engagement and can become overwhelming after a time, perhaps even causing the gamer to turn to a different activity.

Challenge can commonly be described as the feature most associated with effective design in a game (Sweetser & Wyeth, 2005). When a challenge is presented to a player, they will do their best to get through it. Their focus will be on finding a solution to whatever problem is keeping them from their goal or from advancing in what they are doing. However, the game should offer a calibrated challenge that the player, at their present level of skill, can reach. If their skill is being stressed past the point where they are able to perform, and they are not able to continue building skill because the present level of the game is too hard, the gamer will stop playing the game. It no longer presents an opportunity to grow, instead they will see an obstacle that is impassable and move on to something else that provides the entertainment and flow that they are looking for.

This directly leads into the next area, which is player skill. As mentioned above the game needs to allow the gamer to maintain progress throughout the journey. Without support for participants' skill building, in the form of challenges matching current skill levels, the flow of the game will come to a halt (Sweetser & Wyeth, 2005). If, on the other hand, the game offers calibrated challenges and helpful guidance – without directly intervening in active gameplay – the player should be able to hone their skills while staying engaged with what is happening.

Another important aspect of calibrating challenges is the control that is allotted to gamers as they advance through the game's various features. They should feel as though they are able to control the actions that they are performing, although they are really choosing from a set of carefully designed possibilities. The games should be inspected very carefully for any issues that may arise that are not within the gamer's control to fix, because if it is not, the sense of control

that was previously felt will melt away and the gamer's interest will turn elsewhere (Sweetser & Wyeth, 2005).

Goals should be clear not only in terms of the overarching aim of the game, but also in terms of the micro goals that will be necessary to accomplish in order to reach the objective (Sweetser & Wyeth, 2005). These goals should be presented at proper times and intervals during the game (p. 6). For example, there is no need to ask players to talk to unimportant characters in the game when they will not be given relevant information. If they choose to do this themselves, it should be under their control, simply out of interest or curiosity.

If goals are completed or the player is at a spot in the game that may require guidance, then feedback should be included, which is the next point. Feedback should be given in timely and relevant fashion (Sweetser & Wyeth, 2005). Players do not specifically need to know how long they have been on a level unless the game is timed; they should, however, be aware of critical information such as progress, actions, status and scores (p.21).

Immersion is another critical element needed to induce flow (Sweetser & Wyeth, 2005). Immersion is continuously being studied by game researchers in order to allow players to be drawn in completely without having to try very hard. It should not take hours of concentration for the gamer to feel engrossed in the game. Instead, there should be features introduced periodically to uphold a sustained immersion for whatever the length of play may be.

The last element that should be included is social interaction. Social interaction may have a somewhat oblique relation to flow, since it can take people away from immersion in the world of the game (Sweetser & Wyeth, 2005). Therefore, rather than enforcing social interaction, it may be wise to provide options that allow gamers to participate, or not, in social interaction, as they choose. Having the choice available can only add to the gaming experience.

Concentration, loss of self-consciousness and distorted sense of time – basically Csikszentmihaly's flow state – become apparent when design parameters have been met that allow the player to enter the zone (Sinclair et al., 2007). These areas need to be taken into consideration when designing exercise-based games (p. 5).

### **Guiding Design Principles**

In an effort to gain a perspective into active game design, it is important to investigate existing game design principles and how they may lend themselves to the design of active games. It is necessary to characterize crossover between types of game to establish if current active games are as well designed as some traditional games in offering an immersive gaming experience. This comparison will eventually establish what may be missing in current research and design of active games.

Video games have been examined by industry experts and researchers in fields such as education, psychology, anthropology, sociology and medicine to determine the characteristics and benefits of video games (Salen & Zimmerman, 2006). It is from this knowledge base of video game studies that a foundation for game design has been established. This investigation into design of active games builds upon the same foundation. Video games offer players experiences and recruit learning as a form of pleasure and mastery, which are properties of a well-designed game (Gee, 2008a). There is direct relevancy of this toward learning through games and play: "Games aren't just a diversion; there's something valuable and important" (Koster, 2005, p. x). While adults may view play as a waste of time, it actually functions as a mode of learning where kids acquire social, emotional and intellectual skills (Elkind, 2008). Playing a game is an experience, and as Gee (2008a) reports, "people primarily think and learn through experiences they have had, not through abstract calculations and generalizations" (p.

21).

Additionally, “game design is applied learning theory, and good game designers have discovered important principles of learning without needing to be or become academic learning theorists” (Gee, 2008a, p. 22). For example, good learning experiences provide goals, allow for interpretations, practice, explanations, debriefings and feedback (p. 23). These learning experiences are being extended through to well-designed games and are often associated as design criteria within video games.

### **Current Perspective on Active Game Design**

One group of researchers suggested taking a more holistic approach to the design of exergames by utilizing the physical actions (*form*) of exercise directly in a game (Park et al., 2012). For example, from their perspective, studying running and incorporating the steps and arm movements of running directly to enhance the interactivity of an exergame that may not actually be designed as a running game would be ideal design implementation (Park et al., 2012).

Humans have adapted to less active life styles, and for many humans survival no longer requires large amounts of physical activity for hunting and gathering, but there is still a physical need to remain active (Ananthaswamy, 2013). Human instinct today is to render exercise not enjoyable, but once a person engages in physical activity, benefits such as a runner’s high or the closely related, being in the zone (similar to flow) can make it feel more enjoyable (para. 14).

A video game is at its core, a game. However, as seen throughout this chapter, a multitude of behind-the-scene aspects help to bring it to its full potential. When exercise is introduced, a balance must be struck that molds the idea of the game into a fully functional and enjoyable piece of work. Active games have the potential to influence obesity with positive outcomes through regular use (Staiano & Calvert, 2011). Documented evidence shows that

active games can be successful (Garris, Robert, & E., 2002; Haddock et al., 2010; Hansen & Sanders, 2011; Lieberman, 2006; Staiano & Calvert, 2011). Research shows that users can be influenced through motivation, flow, social engagement and game design (Berkovsky et al., 2009; Csikszentmihalyi, 2007; Garris et al., 2002; Mueller et al., 2010; Park et al., 2012; Sutton-Smith, 1997). With that being said, there are currently no studies that categorize specific design mechanics in active games that would be useful to active game developers and researchers attempting to understand and incorporate engagement in games.

### **Summary**

A review of literature suggests that active gaming is a viable resource for reducing sedentariness and is a way to increase fitness levels. Active gaming, however, does not seem to be gaining the same momentum as did traditional gaming when it comes to frequency of use or duration of engagement. While today's devices provide impressive technology that allows for more physically engaging game play, the array of available game selections for active gaming is still rather thin. To remedy this, it is important for designers to understand game mechanics and features in relation to underlying concepts of game play that directly influence motivation and engagement, and to consider how to apply them to active games. Based on the literature reviewed, three key areas relate to the design of active video gaming. Motivation, social influences and flow are key concepts under consideration in this review of games mechanics and features associated with effective game design and are potentially meaningful considerations in design of active games.

**Motivation.** Motivation prompts people into engaging in an activity. In gaming, a variety of motivators make people want to play or continue to play. The addition of new genres within gaming allows for enriched motivation via different opportunities and experiences. Players take

satisfaction in investigating and being immersed in game worlds while achieving goals. Motivated by success and defeat, players learn to be adaptable and to strategize with others. Players appreciate encountering challenging situations of increasing difficulty but where goals are still attainable. Today's gamers are also highly motivated by connectedness; being able to play with others, whether in person or online, keeps them playing for longer periods of time.

**Social activity.** Video gaming today can be a very social process and is no longer viewed as antisocial. Complex play in video games stimulates the process of high order thinking within individuals (Gee, 2003; Vygotsky, 1978). At the same time, there is often a degree of forced communication because of the cooperative aspect of multiplayer gaming. Through cooperation, players tend to become more engaged in gameplay. This type of interaction allows them to reach goals together, and it provides a level of enjoyment similar to what is seen in exercise groups (Mueller et al., 2010). Keeping play as natural and relevant as possible is important (Mueller et al., 2010). It reduces potentially negative aspects of complexity in gameplay (e.g., complex gameplay frustrating players), as the experience becomes more about play and sociability and less about immediate progress in the game. Another aspect of social play is the need to fit in and be part of a larger group. In this regard, it also pushes players to game harder and with more intensity so as not to disappoint their friends. Gaming with more intensity usually means that they are in a zone – a state of concentration – yet they are fully engaged in game play and socializing with their comrades.

**Flow.** Flow, or being in the zone, is mostly recorded when a person is engaged in their favorite activity, sport, hobby or leisure activities. It signifies that a person is in an effortless state of engagement (Csikszentmihalyi, 1997). Video gaming, especially with well-designed games, is one practice in which participants find flow. In this ideal state of balance between

skills and challenges, goals are set, feedback is immediate, actions and awareness merge, self-consciousness disappears, time distorts and the act becomes automatic (p. 31). Players often experience full immersion, losing track of time and ignoring outside distractions. They are able to match skills with challenges to experience a gameflow (Sinclair et al., 2007; Sweetser & Wyeth, 2005). Gameflow can be understood by looking specifically at concentration, challenge, progress, controllable actions, feedback, and immersion. Additionally, social interaction should be an option (Sweetser & Wyeth, 2005), though the game should not make this mandatory due to the possibility of loss of concentration for some individuals,.

There are many aspects of traditional game design that can and are being carried over to active gaming. However, games in this genre are not being produced often or progressing in form or gameplay. The technology for active gaming is available; what is needed now are well-designed, engrossing games to help reduce sedentariness.



## **Chapter 3: Methodology**

### **Introduction**

This study is designed to identify ways in which specific design mechanics in active games address motivation. Through a Delphi study, nine experts answered questions about specific types of motivation related to active gaming; specific game mechanics that address motivation; and recommendations on the effective uses of those mechanics. After the first round of questions, the answers were reviewed for consensus among the respondents. When answers to a question did not reflect consensus among respondents, the question was reissued in round two, with samples of previous answers shown so that participants could reflect and have the opportunity to change their perspective if necessary. Responses were reviewed, coded and analyzed for either further inquiry in round two or final conclusion. All retired questions were shared with participants in round two noting the results of round one. Eventually both rounds were coded and analyzed to identify common themes and recommendations. Research was approved by Pepperdine University's Institutional Review Board (Appendix A).

### **Research Question**

Which, if any, game mechanics and features can a panel of experts in academia, health and the game industry agree on as valuable and impactful to the construction of successful and engaging active games?

### **Design and Methodology**

This Delphi study was not designed to determine effects of the games on users; rather it was designed to seek consensus from industry professionals, health professionals and researchers, regarding the features and mechanics which affect motivation in active games. Emphasis was placed on strategies used in other games that are also integrated into active games.

Active game researchers, healthcare practitioners and game developers have unique perspectives on what makes games successful. Active gaming is still a relatively new phenomenon, especially with the rapidly changing technologies in consoles and mobile devices. Motion sensors such as gyroscopes, accelerometers, compasses and barometers have significantly changed the potential of games to require physical activity. Despite the recent increase of research in active gaming, research providing recommendations on how design influences player motivation is limited. Additionally, active game research often focuses on the impact of a single intervention, rather than an overview of methods used across the field. Finally, the active gaming field includes academic researchers, as well as game designers, and implementation experts with experience in using active games with a wide variety of users. Individuals in all three of these areas have a unique perspective on how the design of active games influences motivation. This research gives experts ways to discuss motivation and design with colleagues who have strengths in each of these areas. While the experts in this field are known to each other, they rarely meet in person, due mainly to geographic location and diverse backgrounds (Linstone & Turoff, 2002).

This study asked a panel of experts in academia, health and the gaming industry to weigh in on game features and mechanics that they believed could positively affect player motivation. A Delphi methodology was used to seek consensus or majority agreement among this panel of experts with diverse professional backgrounds. The study acknowledges each respondent works primarily in one of three different roles: who are using or have used active games with various populations in a multitude of settings, who design active games, or who research impacts. Expertise in each of these three roles should help all respondents articulate what mechanics lead to motivation can help inform game design and further influence implementation.

## **Reliability and Validity**

Pilot-testing the survey instruments is an important part of reliability for the Delphi study method (Okoli & Pawlowski, 2004). Reliability is about maintaining consistency of the instrument and its contents, as well as with administering the surveys to ensure validity of the study (Creswell, 2009). To ensure reliability and validity, a pilot-test was administered to a small group of three participants who were not pre-selected for the main study. The pilot-test group consists of games and educational technology professionals at the game development studio with research expertise in active games. After the pilot-test was administered, the pilot test participants were asked to analyze the usability of the test to determine if the survey items, including directions, were easy to read and comprehend. These suggested changes were implemented before the final research project began.

## **Subjects**

Expert participants for this study were identified as leaders in the field that reflect three different perspectives: academics, practitioners and game designers. The selection criterion for the participants is based on their visibility, publications and referrals. Twelve participants were chosen from various professions. Academics, the first category, consist of experts who actively research active games in various environments. The second category includes practitioners within medical or community health professions who have purposefully used active games in communities, schools or medical practices. The third category consists of game designers who have created games for health as well as other genres and who are professionals in the industry.

Initially, the twelve potential experts chosen for the study were contacted via email for participation availability (Appendix B, C). All participants had either met the researcher, knew of her work in active games, or shared professional colleagues with the researcher. The expert

participants that did not respond to emails were sent a follow up email and some were contacted via social media sources Twitter and Facebook. Additionally, the researcher asked those who agreed to participate to recommend other possible experts or to speak on the researchers' behalf to potential participants.

### **Final Sample**

This study intended to obtain twelve expert participants representing academics, practitioners and game designers. In all, fourteen people were contacted due to low or late responses from participants in the initial request. In the end ten participants ended up confirming their willingness to participate, but only nine ended up actually taking the survey. While the participants are known, and have consented to be included in this study, the researcher did not tie responses to each person, so it is unknown which respondent said or responded in which way.

**Academics researchers.** Academic researchers were chosen to reflect diverse backgrounds, similar to the diversity of disciplines that study active games. They publish active game articles in a variety of journals in fields such as medicine, physical education and games for health, have incorporated clinical studies in their research, and have become authorities in this field.

**Medical and community health practitioners.** The medical and community health practitioners were chosen based on their extensive community outreach work with obesity prevention and physical fitness and their extensive use of active games. This group of experts either prescribes or conducts interventions with a wide variety such audiences and location such as medical centers, county extension service outreach, schools and exergaming facilities.

**Game designers.** The game designers were chosen for their expertise in games design and are distinguished in health-related games. The designers are the target audience for

implementing the findings of this study. They are familiar with game mechanics and content specific to health games.

### **Instrumentation: The Delphi Survey**

The survey design was 5-scale Likert with a range of *strongly agree* to *strongly disagree* and *no opinion*. Each question included an open response space for respondents to clarify or justify their selection opportunity for open ended input.

The survey was constructed in three sections: Motivation included 10 statements, Social Influence had 5 statements and Flow included 6 statements. Statements were derived from the literature review, as described below. An identical form used by the sample is included in Appendix D and summarized below.

**Design regarding motivation.** Motivation is what prompts people to engage in some type of activity. In gaming, what motivates gamers to play comes from many different influences and perspectives. The following section centers around motivation and how it may influence active game design. The survey prompts were as follows:

1. Avatars should realistically represent the player's body type, shape, weight and height — including changing over time as the player's body changes.
2. Feedback in active games should always be positive, thoughtful and encouraging without criticism.
3. Game characters in-game should push players to do more and set higher goals as a way of encouraging continued progress towards the next goal.
4. Active games should engage with the player on a personal level using information for welcoming back players by name, maintaining friendly dialogue, or making personal suggestions.

5. Active games should offer player achievements such as unlocking levels, generating scores and leader boards.
6. Active games should hide the fact that they are exercise based.
7. Active games should make the activity apparent, so that players can learn and acquire healthy exercise attitudes.
8. Active games should embed workout activities in quest or story lines.
9. Goals should be set by the game for the player once BMI measurements are acquired.
10. The player must be able to modify goals and level of difficulty of intensity.

**Design regarding social influences.** Video gaming in most regards has become a very social activity. Sociability in gaming is accomplished through online communities and in real life; it also influences teamwork and competition. The following section centers around social influences and how they may influence active game design. The survey prompts were as follows:

1. Active game should allow players to share progress with others via social media apps such as Twitter, Facebook and Instagram.
2. Active games should support cooperative play options.
3. Active games should support competitive play options.
4. Social accountability in active games, through sharing goals with others and posting daily progress, makes players work harder.
5. Active games developers should build community around multiplayer active games.

**Design regarding flow.** People are at their happiest when they are at their optimal level of concentration. An absorption so deep the world around ceases to exist. This effortless state of engagement is referred to as 'flow'. The following section centers around flow activities and how they may influence active game design. The survey prompts were as follows:

1. For active games a primary goal is to associate the desirable 'flow' state with exercising, not with gaming.
2. To help players achieve 'flow' designers should make players set personal overall goals such as losing weight, running faster or personal best.
3. Active games should allow players to cultivate chances for enjoyment, for example mix and matching exercise or creating their own routines.
4. Active games should provide players with information about their performance during play.
5. As players concentrate harder and continue to acquire skills, gameplay should become increasingly difficult.
6. Active games should help players choose challenging levels of play.

### **Data Collection Procedures**

Delphi surveys are conducted in successive rounds until agreement is reached or until it is clear there will be no agreement, e.g., responses are unchanged between rounds. Items for which agreement is reached are retired or removed from the survey for successive rounds. Thus, in each round the survey becomes shorter. In this study, the Delphi went two rounds.

The criterion for removing statements from the survey was based on pooling the agree/strongly agree and the disagree/strongly disagree responses. If 70% of the respondents in round one were in agreement, the item was retired. Round 2 had more responses and the questions were retired at 67% of the total or six out of nine in agreement. At the end of the second and final round, only one statement still did not meet the criterion for 'agreement.' The statement is described below in analysis.

These findings are consistent with Delphi methodology, as it is rarely seen that a Delphi

be distributed more than three rounds (Delbecq, Van de Ven, & Gustafson, 1975; Linstone & Turoff, 2002).

After subjects were invited to participate, the process was explained to them in full in an email. The first survey was uploaded to an online survey tool and a link was provided to the participants. An informed consent form was included at the beginning of the survey allowing subjects the voluntary option to participate based on detailed information provided regarding the study (Appendix D). Each respondent was asked to identify themselves as a researcher, practitioner or a game designer. Anonymity was maintained as no names were collected as per study requirements. Respondents had a two-week window to complete each round.

### **Data Analysis**

At the end of the two-week window, and after each round, Likert responses for each item were tallied. Items were retired if they met the following criteria: after pooling the agree/strongly agree and the disagree/strongly disagree responses and a consensus was reached with a majority rule of at least 70% in agreement. For items that were not eligible to retire from the survey, the open-ended responses were examined. Quotes from the comments box that seem to be most representative of the Likert score, were then identified and a quote or two from the opposing side were included so that the participants may have a balanced perspective from which to reflect upon in the second-round survey.

The first round retired fifteen of twenty-one questions, since consensus was reached. There were six remaining questions that resulted in a split and were returned to participants in the round two. The participants were asked again to identify their primary role as a practitioner, researcher or game designer. For those questions in the remaining list of six that had a significant number of no opinions in the Likert scale during round one, participants were asked to try and



side with an opinion. Round two survey included the list of tallied statements retired from the first round and samples of actual participant responses as identified earlier.

The survey remained open for two weeks. Once closed, the survey was analyzed and tallied with only one statement remaining in split. Q3. Active games should make the activity apparent, so that players can learn and acquire healthy exercise attitudes. A consensus was reached with five of the six remaining questions, and with only one statement remaining the researcher concluded with round two of the study with no further surveys conducted. The findings and conclusion were generated after analyzing the collect data by coding, theming and summarizing results.

## **Chapter 4: Findings**

The purpose of this study was to identify specific design mechanics and features that are deemed valuable and impactful to the construction of active games through the consensus of experts with a shared interest in games such as academia, health care and game industry. This was accomplished through a Delphi study where the researcher solicited anonymous feedback using a survey tool. The survey prompted for written responses and Likert scale choices. Two rounds of surveys were required in order to gain consensus from the expert panel.

The sample ended up being predominantly academic and practitioners, and not as mixed as anticipated so the researcher was unable to address how they varied by sector, but even with the imbalance of groups there was disagreement. The questions were distributed through the Delphi process. After being sent out for answering the first time the answers were each individually analyzed. If the question reached a majority ruling (minimum of 70% agreement), the question was retired and did not go out for a second round. If there was not a clear consensus the question was then sent out for a second time, with anonymous comments on the pro and con side of the disputed statements. For this study, two rounds of questioning were carried out. A majority criterion was reached with five of the six remaining questions, and with only one statement remaining in round two the researcher was able to conclude the study.

### **Research Question**

Which, if any, game mechanics and features can a panel of experts in academia, health and the game industry agree on as valuable and impactful to the construction of successful and engaging active games?

### **Results of Survey**

Both rounds of the survey are discussed within this section. Each statement and results of

the Likert scale will be listed as it was in the survey. The question, Likert scale results and all participant comments are included in Appendix G. If a question did not reach consensus and was redistributed, the second-round results were included alongside the information from round one within the tables of results. Included within the results tables are columns for the Likert scale ranges, participant comments (S# = subject) and which survey Round. A summary of analysis is provided at the end of each question. The survey was broken down into three main categories to coincide with the literature review; motivation, social influence and flow. Prior to taking the survey participants were asked to consent to participation in the study, and to select a profession they most closely identified with.

### **Active Gaming and Design Survey**

The opening section of the survey included statement 1, which was the required informed consent agreement for participation and acknowledgment of their understanding and purpose of study. Statement 2, asked participants to self-identify as either a researcher, practitioner, or game designer. There were three main sections in the survey: (a) Design Regarding Motivation, (b) Design Regarding Social Influences and (c) Design Regarding Flow.

**Design regarding motivation.** There were ten original statements in this section asking expert panelists to consider how motivation may influence active game design in Round 1. Six statements were returned to the panelists for further inquiry in Round 2. There was only one remaining question at the end of round two, the entire study was retired.

***Avatars and body shape.*** Statement 3 addressed avatars and the player's body type, shape and weight. Consensus was not reached in the first round, so this question was asked twice of the participants, once in Round 1, and once in Round 2. The question was included in the second round with a sample of a response for both agree and disagree category to be taken into

consideration when participants were answering in the second round. The wording of the question was the same in both rounds. Round 2 also provided the results of the first round.

Table 1

*Avatars and Body Shape:*

---

Avatars should realistically represent the player's body type, shape, weight and height — including changing over time as the player's body changes

---

	Strongly Disagree	Disagree	Agree	Strongly Agree	No Opinion
Round 1 ( <i>N</i> = 7)	1	2	3	1	0
Round 2 ( <i>N</i> = 9)	2	6	1	0	0

---

*Note:* Distribution of Responses in Rounds 1 and 2

***Avatars and body shape: summary.*** Table 1 - looks at statement three over two rounds, notice the largest shift from an agreement of three to a disagreement of six after comments were provided for consideration in Round 2. A strongly agree also shifted to an opinion of disagree or strongly disagree. Additionally, two participants who did not participate in Round 1 ended up participating in Round 2. Ideally this should not happen and demonstrates the need to code participants even when working with small sample sizes.

Comments for consideration from Round 1 were provided in the second round and were done so based on opposing views. The researcher needed to gain further clarity from participants that either did not provide enough commentary or provided no opinion in Round 1. The comments provided to participants in Round 2 were as follows:

- Strongly Disagree: The wonderful world of digital games is that the player has the ability to control their images and be who and what they want to be in the digital

space. If the avatar is restricted to the person this may result in disengagement as some may not want to be reminded of their somatotype.

- Agree: Would give a sense of realism and motivation to the user, allowing the user to be more engaged with their avatar.

Though consensus in the first round was not reached, there were some agreements in the comments, with one person noting the importance of giving the player control over how to create their avatar. “The wonderful world of digital games is that the player has the ability to control their images and be who and what they want to be in the digital space” – S8. Two respondents noted the importance of showing an avatar change over time (as the player changes). Two noted that an idealized version of the player could be good, but that there could be harm in showing negative change (weight gain). In the second round, there was greater emphasis in the positive value of showing an idealized avatar (with four respondents commenting on this), as well as the importance of giving the player control over the what kind of avatar to create, possibly creating one that is similar or different to self. “I think it depends on the player’s preference, whatever motivates them to play the game” – S7 and “Creating an idealized version of self is one of the primary reasons players enjoy avatar-based games” – S2.

Overall the strongest themes that emerged were that idealized versions are most accepted and control belongs to the players. Based on experts’ feedback, avatars may not need to be realistic or change over time. Players should have control of their avatars and may want an idealized version of themselves, but realistic representation is not necessary. It might even be discouraging when showing physical effects like weight changes.

***Feedback in active games.*** Statement 4 addressed the issue of game feedback always being delivered in a positive manner. Consensus was reached in the first round, so this question

was not included in the second round of surveying and was set aside for analysis.

Table 2

*Feedback in Active Games:*

---

Feedback in active games should always be positive, thoughtful and encouraging without criticism.

---

	Strongly Disagree	Disagree	Agree	Strongly Agree	No Opinion
Round 1 (N = 7)	0	5	1	1	0

---

*Note:* Distribution of Responses in Round 1

***Feedback in active games: summary.*** Table 2 – statement 4 shows tallied results with the majority (5 of 7) participants disagreeing with the statement. A majority criterion was met during the first round eliminating the need for further analysis.

Collective themes emerged; feedback should be balanced, positive and constructive when negative. Balanced feedback is a must as both negative and positive feedback should be distributed with tact and thoughtfulness in mind. One respondent added, “honest direct feedback given in a thoughtful manner was key” – S6, and “failure to inform the players could cause misunderstandings of real life situations resulting in failure” – S8. Feedback is a critical component of any game, it is particularly important in active games because it encourages the player to continue engagement of physical activity, helping them understand their progress. In-game mechanics can be used to push players to do more, set higher goals, and encourage progression. Players are allowed opportunities to create goals tailored to their specific needs.

***Game challenge.*** Statement 5 addressed how in-game characters should provide challenge for the players for continued progress. Consensus was reached in the first round, so

this question was not included in the next round of surveying and was set aside for further analysis.

Table 3

*Game Challenge:*

---

Game characters in-game should push players to do more and set higher goals as a way of encouraging continued progress towards the next goal.

---

	Strongly Disagree	Disagree	Agree	Strongly Agree	No Opinion
Round 1 (N = 7)	0	0	3	2	2

---

*Note:* Distribution of Responses in Round 1

**Game challenge: summary.** Table 3 – statement 5 displays the overall group count as being rooted in the agree categories with (5 of 7) participants feeling that it is beneficial to have in-game characters motivate the players to continue on with the game and whatever task is currently at hand for them. No further analysis was needed a majority criterion was met.

Overall theme was characters are seen as motivating and may help sustain interest. One respondent stated that it could “push people a bit, give hints and unlock for momentum” – S3. Another respondent added, “levels in games engage players, help sustain game play, but also allows players to understand active participation” – S8. “Goals should be tailored to the individuals’ current condition, as well as likes and dislikes” – S2. It is important for developers to help players maintain a level of commitment; this can be done in a variety of ways, but respondents agree that for active games, in-game character led motivation may be useful.

**Personal connection.** Statement 6 addressed how active games should take a personalized approach to player engagement. Consensus was reached in the first round, so this

statement was not included in the next round of surveying was set aside for further analysis.

Table 4

*Personal Connection:*

---

Active games should engage with the player on a personal level using information for welcoming back players by name, maintaining friendly dialogue, or making personal suggestions.

---

	Strongly Disagree	Disagree	Agree	Strongly Agree	No Opinion
Round 1 ( <i>N</i> = 7)	0	0	4	2	1

---

*Note:* Distribution of Responses in Round 1

***Personal connection: summary.*** Table 4 – statement 6 there is a majority opinion with (6 of 7) participants agreeing or strongly agreeing with the statement. No further analysis was needed a majority rule was met.

Participants written responses had overarching themes that personalization can be a nice choice, be unobtrusive and not a necessary feature. Written responses were overall in agreement that personalization is a nice feature, but stated that personalization should be limited. “Introducing a personal connection and personal identifier may create a novel experience for the player, use caution as more advanced players may find this intrusive and obstructive to their game play” – S8. Two responses indicated personalization will help engage the player. “Making it personalized will engage the user more” – S6. Three other participants felt it was a nice feature but not necessarily crucial. Personalization within active games includes ways in which the game tailors the activity to the player. It may include addressing the player by name and remembering returning players. This personalization can be a nice feature that may help engage the player, but should be optional as it may be seen as intrusive or obstructive to game play.



**Player achievements.** Statement 7 addressed player achievements unlocking levels, scores and leader boards. Consensus was reached in the first round, so this statement was not included in the next round of surveying and was set aside for further analysis.

Table 5

*Player Achievements:*

---

Active games should offer player achievements such as unlocking levels, generating scores and leader boards.

---

	Strongly Disagree	Disagree	Agree	Strongly Agree	No Opinion
Round 1 (N = 7)	1	0	2	4	0

---

*Note:* Distribution of Responses in Round 1

**Player achievements: summary.** Table 5 – statement 7 – most of the respondents, (6 of 7) agreed that adding in achievements to active games would be beneficial, with only one outlier in the disagree category. A majority count was met and no further analysis was conducted.

Overall the respondents agreed that achievements are beneficial. An interesting difference with the responses for these questions was that one respondent noted that achievements were common practice in active games while another disagreed stating, “it seemed to be missing in most game and would certainly be a novel addition to active games” – S8. While responses were fairly similar, one in particular stood out, “tying score to physiological parameters such as heart rate” – S8, was an intriguing suggestion for developers to consider. Player achievements such as unlocking levels, generating scores and leader boards is fairly standard in all games, but introducing new ways to measure progress could generate continued interest.

**Exercised based.** Statement 8 addressed the value of hiding the fact that active games include exercise. Consensus was reached in the first round, so this statement was not included in the next round of surveying and was set aside for further analysis.

Table 6

*Exercised Based:*

---

Actives games should hide the fact that they are exercise based.

---

	Strongly Disagree	Disagree	Agree	Strongly Agree	No Opinion
Round 1 (N = 7)	1	4	0	0	2

---

*Note:* Distribution of Responses in Round 1

**Exercised based: summary.** Table 6 – statement 8 reached consensus in the first round with a (5 to 7) majority. No further analysis was needed a majority rule was met.

Overarching outcome was there is no need hide the exercise. Five of the participants felt it was not necessary to mask the exercise with comments like, “players need to be self-aware” – S5 or “they’ll figure it out” – S3. In contrast, one participant did note, “it may be useful for individuals with limited interest in exercise or children who enjoy playing in traditional games like tag” – S8. One respondent felt it would be dependent on the situation as some kids enjoy active play while other individuals actually like exercising. Though most of these particular responses were brief, experts agreed that even though players may not find exercise interesting it is unnecessary to hide the exercise within game play.

**Physical activity and healthy attitudes.** Statement 9 addressed the practice of revealing exercise activities as physical activity, so player acquire healthy attitudes towards exercise from the start. Consensus was not reached in the first round, so this question was asked twice of the participants, once in Round 1, and once in Round 2. The question was included in the second round with a sample of a response from the agree responses as there weren't disagree comments to be taken into consideration when participants were answering in the second round. The samples chosen were based on the thoroughness of the response and if it met the criteria of the inquiry. The wording of the question was the same in both rounds. Round 2 also provided the results of the first round.

Table 7

*Physical Activity and Healthy Attitudes:*


---

Active games should make the activity apparent, so that players can learn and acquire healthy exercise attitudes.

---

	Strongly Disagree	Disagree	Agree	Strongly Agree	No Opinion
Round 1 (N = 7)	0	0	4	0	<b>3</b>
Round 2 (N = 9)	2	2	2	2	1

---

*Note:* Distribution of Responses in Rounds 1 and 2

**Physical activity and healthy attitudes: summary.** Table 7 - looks at statement nine over two rounds. Notice the change of the near even split in Round 1 to a more distributed split in Round 2 with two counts in each of the choices from strongly disagree to strongly agree and one in no opinion after comments for consideration were provided. Additionally, two participants who did not participate in Round 1 ended up participating in Round 2. Ideally this should not

happen and demonstrates the need to code participants even when working with small sample sizes. A majority criterion was not met in either round, making this the only question to have remained split.

Comments for consideration from Round 1 were provided in the second round and were done so based on agreement responses as those were the only ones provided. The researcher needed to gain further clarity from participants that either did not provide enough commentary or chose no opinion in Round 1. The comments provided to participants in Round 2 were as follows:

- Agree: Better to be upfront with the user
- Agree: Health behaviors should be positive and we should learn to measure them
- Agree: Ideally, the game is a gateway to a overall healthy lifestyle.

In the second round this statement still did not achieve consensus, however, it was retired because the rest of the remaining questions in the survey did reach a majority criterion, putting an end to the survey rounds.

In Round 1, a respondent called it out as a poor question. Though it was retired, analysis of the open-ended responses reveals some interesting points. In the first round, two noted that it depends on the situation of the player, or type of game. For example, “an older person in rehab may not mind a health and fitness focused game, but a child would not be interested” – S8. Four others were in agreement. One respondent felt it was better to be upfront with the players. Another recognized active games as a possible gateway to healthier lifestyle. “Ideally it is a gateway to healthy lifestyle” – S3. Also, noted was, “healthy behaviors should be positive and measured” – S5.

The second round yielded another split. Three of the four respondents in agreement

commenting that “physical activity be made apparent” – S9 and “that it’s important to foster positive messages about healthy behaviors” – S5. Two maintained that active games be a gateway to a healthier lifestyle. The next five respondents were in disagreement and four commented that it was unnecessary to have physical activity at the forefront, it was more important to have fun, as people are already blasted with educational messages about health and exercise. One respondent with a differing view added, “the stealthier the message the more opportunity there is for fun to take center stage” – S2.

The strongest themes that emerged were viewing active games as gateways to healthier lifestyles and exercise does not have to be blatantly apparent nor does it have to be hidden. Experts in this study prefer that players be self-aware because it teaches healthy pathways, and the real emphasis should be on fun activities that encourage positive behavior changes.

**Quests and storylines.** Statement 10 addressed the idea of using quests and stories to facilitate exercise. Consensus was not reached in the first round, so this question was asked twice of the participants, once in Round 1, and once in Round 2. The question was included in the second round with a sample of a response for both agree and disagree categories to be taken into consideration when participants were answering in the second round. The samples chosen were based on the thoroughness of the response and if it met the criteria of the inquiry. The wording of the question was the same in both rounds. Round 2 also provided the results of the first round.

Table 8

*Quests and Storylines:*


---

Active games should embed workout activities in quest or story lines.

---

	Strongly Disagree	Disagree	Agree	Strongly Agree	No Opinion
Round 1 ( <i>N</i> = 7)	0	1	2	1	3
Round 2 ( <i>N</i> = 9)	1	5	2	1	0

---

*Note:* Distribution of Responses in Rounds 1 and 2

**Quests and storylines: summary.** Table 8 - looks at statement 10 over two rounds, there was a visible shift from three in no opinion, to a gain of four in disagree and one in strongly agree. Additionally, two participants who did not participate in Round 1 ended up participating in Round 2. Ideally this should not happen and demonstrates the need to code participants even when working with small sample sizes.

Comments for consideration from Round 1 were provided in the second round and were done so based on opposing views. The researcher needed to gain further clarity from participants

that either did not provide enough commentary or chose no opinion in Round 1. The comments provided to participants in Round 2 were as follows:

- Agree: Narratives have been used as a way to initiate and sustain interest. Whilst active games have created a buzz and interest sustainability has been an issue. This is similar to the stealth approach above and as mentioned needs to be addressed according to the target population.
- Disagree: Dance Dance Revolution or EyeToy Kinetic never had narratives, per se.

While consensus was not reached in the first round there were some agreements among the respondents. Two respondents were in favor of storyline stating, “that narratives are way to initiate and sustain interest and suggested more research in narrative medicine” – S5, S8. Although, one respondent disagreed pointing out, “*Dance Dance Revolution* and *EyeToy Connect* never had narratives” – S7. Another favorable response mentioned the idea of having challenges interspersed in the game. Three respondents who selected no opinion, but left comments, stated “that it is depended on the goals and context of the game” – S4, or “it could go either way. I don’t agree or disagree” – S3. While the third respondent noted that “quests were good, but was not in favor of story driven games because they distract players” – S2.

Round two of the survey process reached the criterion for majority of 70% with (6 of 9) participants disagreeing with a quest or story based approach. Four respondents remarked, that a quest or storyline was not necessary. “It is fine to have a story line, but I don't think it is essential in order to get a good workout” – S9. Two noted quests and story based games as motivating and may be an option as a type of active game. The three respondents in favor of quests and storylines felt as though commercial games such as, “*Dance Dance Revolution* and *Dance Central* lost their novelty after a few weeks. A continuing narrative is one way to keep players

coming back for more” – S2. One person mentioned story based games should also allow workout choices. It seems as though narrative piqued the interest of some participants and it’s not something that is very common in active gaming, so a continuing narrative might keep players coming back, though experts cannot reach consensus on this.

The strongest theme that occurred was in favor of narrative or preferably quest based games as a way to sustain interest, yet some accompanying opinions in favor of also stated they are not necessary, but certainly could be a choice. The next theme that emerged was when to use such a game and it would be dependent on goals, context of game and player situation. Embedding workout activities within in-depth quests or storylines may be new avenue to explore as these types of games are not common in active games.



***Pre-Defined goals and BMI.*** Statement 11 addressed using a weight measurement such as BMI to set the players goals should be something to be considered. Consensus was not reached in the first round, so this question was asked twice of the participants, once in Round 1, and once in Round 2. The question was included in the second round with a sample of a response for both agree and disagree categories to be taken into consideration when participants were answering in the second round. The samples chosen were based on the thoroughness of the response and if it met the criteria of the inquiry. The wording of the question was the same in both rounds. Round 2 also provided the results of the first round.

Table 9

*Pre-Defined Goals and BMI:*


---

Goals should be set by the game for the player once BMI measurements are acquired.

---

	Strongly Disagree	Disagree	Agree	Strongly Agree	No Opinion
Round 1 ( <i>N</i> = 7)	2	2	0	0	3
Round 2 ( <i>N</i> = 9)	3	5	1	0	0

---

*Note:* Distribution of Responses in Rounds 1 and 2

***Pre-Defined goals and BMI: summary.*** Table 9 - looks at statement 11 over two rounds, notice the complete shift from three in no opinion to an increase in distribution among disagree and strongly agree in Round 2. A single count appeared under agree. Additionally, two participants who did not participate in Round 1 ended up participating in Round 2. Ideally this should not happen and demonstrates the need to code participants even when working with small sample sizes.

Comments for consideration from Round 1 were provided in the second round and were chosen from the disagree side of the scale as there were no comments nor tallies within agreement. The researcher needed to gain further clarity from participants that either did not provide enough commentary or chose no opinion in Round 1. The comments provided to participants in Round 2 were as follows:

- Strongly disagree: Whilst BMI has been used to identify people at risk for certain diseases it is not always a good measure for identifying risk or change. The level of change is also an issue in this case as change in BMI can take a long time and if there is not change in this parameter quickly then adherence may be affected.
- Disagree: BMI doesn't tell the whole story. They may have a high lean weight. Obviously measuring body fat might be difficult to input, but I believe in focusing on fitness.

A majority opinion was not reached during the first round, four respondents either disagreed or strongly disagreed, while three chose no opinion. Four indicated that Body Mass Index (BMI), is an inconsistent measure and a term that turns people off. Three noted that it does not measure health and fitness and is not a good way to measure risk or change. “BMIs are an inconsistent base measurement of health or fitness” – S7. Two of the three respondents with no opinion commented that “it depends on the context and an unnecessary feature” – S4. Also, “goals should be tailored to the player, as BMI is not associated with all active games” – S2.

During the second round, the majority of the responses (8 of 9) were either disagree or strongly disagree. Written statements from six of the respondents noted BMI is only a single factor being measured, making it both too limiting and not accurate enough to create helpful goals for the player's. Three of these respondents mentioned that goals should be set for physical

activity, not weight loss. “Goals should be set on this physical activity behavior itself, not the outcome of weight loss” – S7.

Overall the strongest themes that appeared were pre-defined goals based on BMI measurements can be an inconsistent measurement that does not measure health and fitness levels appropriately, and is too limiting of a factor to be considered reliable for players. Being cognizant of the health and fitness levels of players allows for control to be placed in the hands of the player should they prefer. This means that developers must find a variety of different factors to base players’ goals on, in order to accurately tailor them to be most effective for the individual.

**Player control.** Statement 12 addressed allowing the player to modify goals and intensity levels. Consensus was reached in the first round, so this question was not included in the next round of surveying and was set aside for further analysis.

Table 10

*Player Control:*

---

The player must be able to modify goals and level of difficulty of intensity.

---

	Strongly Disagree	Disagree	Agree	Strongly Agree	No Opinion
Round 1 (N = 7)	0	1	4	2	0

---

*Note:* Distribution of Responses in Round 1

**Player control: summary.** Table 10 – statement 12, six of seven respondents were in agreement that players must be able to modify goals and level of difficulty of intensity. A majority result was met and no further analysis was conducted.

The overall comparison was in favor of player control. One respondent in agreement mentioned that “giving players the ability to modify aspects of the game gives them a continued sense of control and allows those with limitations to specialize the game to their needs” – S8. The other responses from within agreement mentioned “the goals are often not accomplished for various reason, so the game could review uncompleted goals and offer solutions” – S2. The respondent who disagreed noted that it depends on the context and this feature is not required, but could be beneficial. Allowing players to have control may also stimulate engagement. Player control of goals and levels of difficulty allows players to feel empowered and may lead to the completion of goals often not met due to difficulty and limitations.

**Design regarding social influences.** There were five original statements in this section

asking expert panelists to consider how social influences in active game design in Round 1. One statement was returned to the panelists for further inquiry in Round 2.

***Social media and sharing.*** Statement 13 addressed sharing game progress through social media. Consensus was reached in the first round, so this question was not included in the next round of surveying and was set aside for further analysis.

Table 11

*Social Media and Sharing:*

---

Active games should allow players to share progress with others via social media apps such as Twitter, Facebook and Instagram.

---

	Strongly Disagree	Disagree	Agree	Strongly Agree	No Opinion
Round 1 (N = 7)	0	0	5	0	2

---

Note: Distribution of Responses in Round 1

***Social media and sharing: summary.*** Table 11 – statement 13, out of seven responses, five agreed that the ability to share information via social media should be an option and may be beneficial. No further analysis was needed a majority rule was met.

Respondents felt that it may help validate players’ actions and in doing so motivate them to continue working to reach goals. “Social media influences behavior and should be used as an alternative in a secure setting” – S8. Interestingly, multiple respondents also noted that it should be an option to share, but not default because it could be seen as an infringement on the players’ privacy. Two respondent with no opinion, but chose to comment said, “it depends on the game and the context, adding in that it is not a necessary feature, but it could be effective” – S2, S4.

***Cooperative play.*** Statement 14 addressed cooperative play option in active games.

Consensus was reached in the first round, so this question was not included in the next round of surveying and was set aside for further analysis.

Table 12

*Cooperative Play:*

---

Active games should support cooperative play options.

---

	Strongly Disagree	Disagree	Agree	Strongly Agree	No Opinion
Round 1 ( <i>N</i> = 7)	0	0	3	2	2

---

*Note:* Distribution of Responses in Round 1

***Cooperative play: summary.*** Table 12 – statement 14 there is a majority opinion with (5 of 7) participants agreeing or strongly agreeing with the statement. No further analysis was needed a majority rule was met.

When asked to respond about active games supporting cooperative play option, the majority agreed that games should indeed support it. “There is plethora of evidence to support the impact of engaging in exercise that include a social component.” – S8. However, others also added that it should be an option for players to have and not required. As one respondent said, “games are better as personal journeys rather than multi-player competitions” – S2. Active games should support the option for cooperative play, as social components can be beneficial depending on the context of the game.

**Competition.** Statement 15 addressed the support for competitive play options in active games. Consensus was reached in the first round, so this question was not included in the next round of surveying and was set aside for further analysis.

Table 13

*Competition:*

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Active games should support competitive play options.

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	Strongly Disagree	Disagree	Agree	Strongly Agree	No Opinion
Round 1 ( <i>N</i> = 7)	0	0	3	2	2

---

*Note:* Distribution of Responses in Round 1

**Competition: summary.** Table 13 – statement 15, in response to whether or not active games should support competitive play options, (5 of 7) respondents agreed that they should. No further analysis was needed a majority rule was met.

One respondent stated “competition is not absolutely necessary” – S4, but agreed with two others that it has the possibility of increasing motivation of players. Another respondent noted “active gaming was a good place to incorporate learning about competition in a healthy controlled environment” – S8. One responded with “it depends on the game” – S2. Deciding on how competition should be introduced into a game, or even withheld, would be dependent on the game itself and taking into consideration how it would either enhance or inhibit the overarching themes and goals of the game. As with cooperative play, competitive play can be effective in motivating people in a healthy controlled environment.

***Social accountability.*** Statement 16 addressed posting progress and goals as a way of social accountability. Consensus was not reached in the first round, so this question was asked twice of the participants, once in Round 1, and once in Round 2. The question was included in the second round with a sample of a response for both agree and disagree categories to be taken into consideration when participants were answering in the second round. The samples chosen were based on the thoroughness of the response and if it met the criteria of the inquiry. The wording of the question was the same in both rounds. Round 2 also provided the results of the first round.

Table 14

*Social Accountability:*

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Social accountability in active games, through sharing goals with others and posting daily progress, makes players work harder.

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	Strongly Disagree	Disagree	Agree	Strongly Agree	No Opinion
Round 1 ( <i>N</i> = 7)	0	1	3	0	3
Round 2 ( <i>N</i> = 9)	0	1	6	0	2

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*Note:* Distribution of Responses in Rounds 1 and 2

***Social accountability: summary.*** Table 14 - looks at statement sixteen over two rounds, notice the agree section gained three tallies and no opinion shifted by one after comments from Round 1 were provided for consideration in Round 2. Additionally, two participants who did not participate in Round 1 ended up participating in Round 2. Ideally this should not happen and demonstrates the need to code participants even when working with small sample sizes.

Comments for consideration from Round 1 were provided in the second round and were



done so based on opposing views. The researcher needed to gain further clarity from participants that either did not provide enough commentary or chose no opinion in Round 1. The comments provided to participants in Round 2 were as follows:

- Agree: Not always, but framed effectively, could be a greater incentive than not having any social accountability.
- Disagree: Yes and no...depends on the person.
- Agree: Some are intrinsically motivated, but this will help many.

Though consensus in the first round was not reached, there were some agreements in the comments, two agreed that social accountability might be a great incentive. “Some are intrinsically motivated, but this will help many” –S3. Three respondents indicated that sharing though social media is a personal choice and for some it may be a motivator, but for others it may not be. “This works for some players but not all players” – S4.

In round two, the majority of the respondents (6 of 9) agreed that it could be effective, (as compared to reflection that comes from journaling), but it should be optional. “It varies, some this will help and others no” – S9. Five respondents noted that it depends on the person to want to use social media as an accountably outlet. “Some people will choose not to play the game if they are forced to post their daily progress or if the game posts their progress automatically” – S1. One response was particularly interesting by taking a cultural perspective into consideration, whether a country’s culture valued cooperation over competition. Should cooperation be of more value players would then more likely be inclined to share.

The strongest themes to emerge suggested that social accountability is dependent upon the person and it should be an optional feature. Experts indicated that sharing active game progress via social media should be an option, as it may help validate players’ actions, while

increasing accountability and motivation to maintain engagement with the game. Social accountability has the potential to make players work harder because their progress is being made public, the effectiveness of this would be dependent on the personal choice to sharing.

**Community.** Statement 17 addressed creating community engagement in multiplayer active games. Consensus was reached in the first round, so this question was not included in the next round of surveying and was set aside for further analysis.

Table 15

*Community:*

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Active games developers should build community around multiplayer active games.

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	Strongly Disagree	Disagree	Agree	Strongly Agree	No Opinion
Round 1 (N = 7)	0	0	4	1	2

---

*Note:* Distribution of Responses in Round 1

**Community: summary.** Table 15 – statement 17 there is a majority opinion with (5 of 7) participants agreeing or strongly agreeing with the statement. No further analysis was needed a majority measure was met.

Creating a community was a favorable approach to engagement and adherence for the majority of respondents, but not a requirement. Most notably a respondent stated, “building a sense of belonging to a bigger group and identifying with others with common interest is a motivator for being active and therefore would be a novel addition to the active gaming space” – S8. Two respondents felt that community was “dependent on the type of the game and context that it wasn’t a necessary feature, but it could be effective in some games”– S2, S4. Providing a communal space in multiplayer games is ideal because communities create a sense of belonging

and can lead to adherence and engagement.

**Design regarding flow.** There were six original statements in this section asking expert panelists to consider how flow may influence active game design in Round 1. One statement was returned to the panelists for further inquiry in Round 2.

**Achieving flow.** Statement 18 addressed the desirability of a flow state for gamers while engaged in physical active particularly within active games. Consensus was not reached in the first round, so this question was asked twice of the participants, once in round 1, and once in round 2. The question was included in the second round with a sample of a response for both agree and disagree categories to be taken into consideration when participants were answering in the second round. The samples chosen were based on the thoroughness of the response and if it met the criteria of the inquiry. The wording of the question was the same in both rounds. Round 2 also provided the results of the first round.

Table 16

*Achieving Flow:*

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For active games a primary goal is to associate the desirable ‘flow’ state with exercising, not with gaming.

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	Strongly Disagree	Disagree	Agree	Strongly Agree	No Opinion
Round 1 (N = 7)	1	1	1	1	3
Round 2 (N = 9)	2	4	3	0	0

---

*Note:* Distribution of Responses in Rounds 1 and 2

**Achieving flow: summary.** Table 16 - looks at statement 18 over two rounds, there was a shift from strongly agree and no opinion, to a gain of two counts in agree and three in strongly

disagree after comments from Round 1 were taken into consideration in Round 2. Additionally, two participants who did not participate in Round 1 ended up participating in Round 2. Ideally this should not happen and demonstrates the need to code participants even when working with small sample sizes.

Comments for consideration from Round 1 were provided in the second round and were done so based on opposing views. The researcher needed to gain further clarity from participants that either did not provide enough commentary or chose no opinion in Round 1. The comments provided to participants in Round 2 were as follows:

- Strongly Agree: Both exercise and gaming are capable of producing a "flow state" which may be compounded or more easily achieved if both are combined. Emphasis should be placed on keeping these activities at a level that allows the participant to be challenged but continue to play without disruption.
- Strongly Disagree: Anything that takes the player out of the game world ("presence") is disruptive.

Consensus in the first round was not reached and there really were no agreements in the comments. Responses within the first round were quite mixed. One noted that gaming and exercise produced flow, and the combination might very well achieve a flow state. Another respondent agreed but said, "but not every day will bring nirvana" – S3. Two respondents disagreed stating it was unrealistic and disruptive to achieve a flow state. Those with responses in the *no opinion* category remarked it was dependent on the type of game, while the other said, "gaming endurance and exercise endurance are not mutually exclusive and may not stimulate the same triggers" – S7.

The second round saw more of accordance within the responses with four respondents

agreeing that flow and exercise go together and are important for a full gaming experience.

“With an active game the two go hand in hand. It is the total experience of the activity that should be considered “flow”. If one does not exist with the other you can not reach a flow state” –

*S4*. Two indicated that while flow is nice to achieve it is not necessary. “It is not bad to just exercise for the purpose of exercising. It is nice to be able to focus on the flow, but not crucial for all games” – *S9*.

Overall the strongest themes that emerged exercise and gaming do fit well together and while it’s nice to achieve flow it is not always necessary. For the most part the majority of comments were in agreement that exercise and gaming should not be viewed independently of one another, they are dependent on each other for the player to reach a flow state. Creating opportunities for flow in active games can prove to be challenging, as there is the flow of gameplay, and the flow of exercise. Trying to associate the “flow” state with one and not the other is not advised. Flow is important to both, and should go hand in hand with one another, a balance is needed in order to fulfill a flow state.

***Achieving flow and personal goals.*** Statement 19 addressed achieving flow with the aid of pre-determined personal goals such as losing weight, running times or personal best. Consensus was reached in the first round, so this question was not included in the next round of surveying and was set aside for further analysis.

Table 17

*Achieving Flow and Personal Goals:*

---

To help players achieve 'flow' designers should make players set personal overall goals such as losing weight, running faster or personal best.

---

	Strongly Disagree	Disagree	Agree	Strongly Agree	No Opinion
Round 1 (N = 7)	1	4	2	0	0

---

Note: Distribution of Responses in Round 1

***Achieving flow and personal goals: summary.*** Table 17 – statement 19 there is a majority opinion with (5 of 7) five respondents sided with disagree and strongly disagree. No further analysis was needed a majority rule was met.

Collectively the five respondents felt that goal setting to help achieve flow as not necessary and likely to not help achieve flow. “Goals may not be properly matched with skill set to meet the challenge which would negate the possibility of connecting with the higher flow state” – S8. Two respondents in this group added, “that flow is a very intuitive process, while goal setting is cognitive” – S5. Requiring players to set personal physical goals, such as losing weight, running faster or personal best is not ideal because the expectations of meeting set goals may not match the player’s skills set negating induced flow.

**Controlling exercise and routines.** Statement 20 addressed allow players to control over the choices of exercise being presented as well as being able to create their own routines. Consensus was reached in the first round, so this question was not included in the next round of surveying and was set aside for further analysis.

Table 18

*Controlling Exercise and Routines:*


---

Active games should allow players to cultivate chances for enjoyment, for example mix and matching exercise or creating their own routines.

---

	Strongly Disagree	Disagree	Agree	Strongly Agree	No Opinion
Round 1 (N = 7)	0	0	3	3	1

---

Note: Distribution of Responses in Round 1

**Controlling exercise and routines: summary.** Table 18 – statement 20 there is a majority opinion with (6 of 7) participants agreeing or strongly agreeing with the statement. No further analysis was needed a majority rule was met.

Collectively themes such as ownership and flexibility appeared. Two respondents strongly agreed, and one said, “allowing player flexibility is great way to take ownership, it demonstrates learning, which will lead to higher levels of efficacy” – S7. Another respondent stated, “personalization and allowing players to choose would stimulate interest and motivate them to continue playing” – S8. Two more stated, “the flexibility could help, but it is likely not critical, and it depends on the context of the game” – S3, S4. Allowing players, the flexibility to mix and match exercise, or to create their own routines helps to create a sense of ownership and demonstrates learning which will lead to higher levels of efficacy.

**Performance feedback.** Statement 21 addressed delivering performance feedback during gameplay. Consensus was reached in the first round, so this question was not included in the next round of surveying and was set aside for further analysis.

Table 19

*Performance Feedback:*

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Active games should provide players with information about their performance during play.

---

	Strongly Disagree	Disagree	Agree	Strongly Agree	No Opinion
Round 1 (N = 7)	0	0	2	4	1

---

*Note:* Distribution of Responses in Round 1

**Performance feedback: summary.** Table 19 – statement 21 a majority of six respondents were in agreement or strong agreement of the player receiving performance feedback during actual game play. No further analysis was needed a majority rule was met.

Collectively motivation and the necessity for feedback ended up being the strongest themes. Although responses on this question were limited, one respondent said, “the choice would be dependent on the player and the situation, because an advanced player may find the constant interrupt annoying while a novice might find it interested and stimulating” – S8. The other three respondents noted that feedback is usually “motivating, it is necessary and informs them of performance such as not being able to pass a level” – S6, S5, S3. Active games should give players information about their performance while they are playing. This feedback is helpful and motivates the players to continue when it is strategically placed in the game.



**Increasing difficulty.** Statement 22 addressed the notion of gameplay becoming increasingly difficult as players acquire new skills. Consensus was reached in the first round, so this question was not included in the next round of surveying and was set aside for further analysis.

Table 20

*Increasing Difficulty:*

---

As players concentrate harder and continue to acquire skills, gameplay should become increasingly difficult.

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	Strongly Disagree	Disagree	Agree	Strongly Agree	No Opinion
Round 1 ( <i>N</i> = 7)	0	1	4	2	0

---

*Note:* Distribution of Responses in Round 1

**Increasing difficulty: summary.** Table 20 – statement 21, there is a majority opinion with (6 of 7) participants agreeing or strongly agreeing that increasing the difficulty of active gameplay as the player acquired new skills and high levels of concentration. No further analysis was needed as a majority tally was met.

The themes appear to relate to a sense of accomplishment and activities need to be aligned with a player’s skill level. There were two who strongly agreed, but left out comments. Three respondents noted level progression keeps players engaged and allows them to feel a sense of accomplishment. Additionally, “it provides players with the opportunity to engage at their skill level in which they may reach a flow stat” – S8. Another respondent said, “balance was essential and maintaining a steady performance was okay” – S3. The respondent who disagreed stated, “exercise adherence isn’t about the exercise getting harder, it’s about coordinating game

progression with basic fitness principles such as, frequency, intensity, time and duration.

Increasing volume should take priority over difficult” – S8. As players advance during game play, so should the difficulty, which should be driven by levels of exercise such as frequency, intensity and duration in consideration with a player’s abilities.

***Predetermined challenge levels.*** Statement 23 addressed providing support to the player by choosing challenging levels for them. Consensus was reached in the first round, so this question was not included in the next round of surveying and was set aside for further analysis.

Table 21

*Predetermined Challenge Levels:*

---

Active games should help players choose challenging levels of play.

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	Strongly Disagree	Disagree	Agree	Strongly Agree	No Opinion
Round 1 (N=7)	0	0	5	0	2

---

*Note:* Distribution of Responses in Round 1

***Predetermined challenge levels: summary.*** Table 21 – This inquiry reached a majority with (5 of 7) participants in agreement: games should help players find the right level of challenge. No further analysis was needed a majority measure was met.

The overarching idea that emerged was that players need to have choice. Providing support, but not taking away the player’s choice for selecting challenging game play, was noted by four of the respondents. One further commented “while providing support, further investigation would be necessary as support may also be a distractor for advanced players” – S8. The one no opinion responder who provided feedback said, “it depends on the game as sometimes help is perceived as coddling and hand-holding, which is a turnoff for many players”

– S2. The second no opinion responder felt they need more of an explanation of what the researcher meant by ‘helping’ the player. Helping players choose challenging levels to play works if the player still has some choice, as providing too much guidance may prove distracting.

### **Research Question Answered**

This study asked, “Which, if any, game mechanics and features can a panel of experts in academia, health and the game industry agree on as valuable and impactful to the construction of successful and engaging active games?” As indicated in this chapter the experts were able to reach agreement on 20 of the 21 questions. Majority of the agreements seem to rest within the sections of social influences and flow. It was much more difficult to gain consensus within the largest of the sections, motivation.

The motivation section had six inquiries reaching consensus on types of game mechanics or feature that may motivate a player to engage in active games. The majority of respondents disagreed with the question that realism of the avatar was ideal. Realistic representation might be discouraging when showing physical effects like weight gain. Instead the expert participants felt players should have control of their avatars, expressing that player preferences are important and somewhat game dependent. Experts agreed players prefer an idealized version of themselves and when providing players with choices it encourages participation.

Feedback in active games should be balanced with both positive and negative critique when necessary to be accomplished with tact and thoughtfulness in mind. Failure to provide appropriate feedback could result in misunderstandings within real-life situations. In regards to character-led games, there was agreement that in-game characters should push players to do more and set higher goals as way of encouraging progression and stop stagnant play. Character led feedback can be motivating, but it is important to keep in mind that goals should be tailored

to the individual's current condition.

Personalization within active games such as, being addressed by name and remembering returning players is a nice feature that may help engage the player, but is not necessarily crucial and should be optional according to respondents. The majority of experts also agreed that player achievements such as unlocking levels, generating scores and leader boards should be used in active games, a few respondents felt this was pretty standard although it should be optional. Creating alternative scoring mechanics such as measuring physiological parameters like heart rate was suggested by a respondent.

The experts agreed hiding exercise within active games is unnecessary as players need to be self-aware. While kids may not find exercise as interesting, it teaches healthy pathways whether it has physical activity or not, it should be fun. Additionally, making the activity apparent creates positive health behaviors, ideally it is a gateway to a healthy lifestyle.

It was determined by the respondents that quests or storylines were unnecessary features, however, it may still be an option to explore as these types of games are not common in active games. A couple of respondents view narrative as a way to initiate and sustain interest, while differing views felt it was dependent on goals and context of the game. Quests were favored over narratives. Yet, some respondents stuck to the idea of games like DDR still being viable, but there were two respondents who felt early active games had lost their novelty and quest based games was open for exploration.

Pre-defined goals based on BMI measurements was not favored by the participants as it apparently is an inconsistent form of measurement. BMI does not measure health and fitness levels appropriately and is too limiting of a factor to use for assessment. All respondents noted players control of goals and levels of difficulty could be beneficial it allows them to feel

empowered and may lead to the completion of goals often not met due to difficulty and limitations.

The result in this section indicate that there is room for exploring other venues such as active game quests. This section also could have benefited from more game designers, there was not enough input from the design perspective, but it did open up avenues for exploration and consideration. Physiological feedback was interesting and may actually provide yet another avenue for game mechanics.

The section regarding social influences reached unanimous consensus with all five inquires by the second round. Sharing active game progress via social media could be an available option it may help validate players' actions and motivate them to continue usage of the game. A majority of respondents agreed that active games should support cooperative play and depending on the context of the game, cooperative play can be a beneficial option. As with cooperative play, the respondents were in agreement that active games should also support competitive play options. Multiple written responses added that competition can be effective in motivating people in healthy controlled environments.

Respondents reached agreement that social accountability has the potential to make players work harder because their progress is being made public the effectiveness of this would be dependent on the personal choice to share, but it could be good incentive. The majority of respondents agreed that game developers should provide options for community around multiplayer games. Communities create a sense of belonging and can lead to adherence and engagement.

This social section was the most intuitive as the majority of participants were in favor of developing community based games. Adults are still leery of sharing on social media, however,

they seem curious as to the effectiveness within active gaming. This avenue is an exciting prospective from a design stand point especially with advancing mobile phone technologies and the ever-increasing connectedness of society.

Creating opportunities for flow in active games can prove challenging but a majority criterion was reached in this section of the study. After the second round the majority of respondents disagreed that the primary goal of active games is to associate the “flow” state with exercising and not gaming. A reoccurring theme of the responses was that flow is important to both and that they should go hand and hand with one another. The majority disagreed with the idea that designers should make players set personal physical goals, such as losing weight, running faster or personal best in order to achieve ‘flow,’ noting that expectations of meeting set goals may not match the player’s skills set negating induced flow. By allowing players the flexibility to mix and match exercise, or to create their own routines helps to create a sense of ownership it demonstrates learning which will lead to higher levels of efficacy according to respondents.

Active games should give players information about their performance while they are playing, feedback would be helpful and motivates the players to continue when strategically placed and become cognizant of the advanced player verses the newbie. As players advance in the game play the difficulty should as well to keep the player engage with activities conducive to their skill set, the opposition had an interesting notation that may be an important design mechanic. Increasing difficulty should be driven by volume such as frequency, intensity, duration over difficultness of the game. Helping players choose challenging levels to play works if the player still has some choice because providing too much guidance may prove distracting in some cases.

Reaching flow states in gaming is nothing new. Research about flow in active games is limited. Result of this survey indicated that there is room for exploration, but this may be the most difficult area within the design process as comments indicate that while it's possible to reach flow states strategic placement for opportunity is very tricky. Creating games from an exercise physiologist perspective might be a very interesting approach.

### **Summary of Delphi Study Results**

After two rounds of Delphi, 20 of the 21 inquires reached a consensus among the expert panelists. Nine of ten questions about motivation, five of five questions about social influences and six of six about flow reached a majority agreement with the expert panel in the second round. Full consensus was eventually reached in the areas of social influences and flow. In the motivation section, one statement having not reached consensus remained split.

Within the design and motivation section, five of the participants disagreed with the statements, while four agreed. The remaining question in this section again did not reach agreement and was retired. Being that it was the only question in the entire survey that did not reach a consensus in both rounds the study was closed. The section regarding social influences received complete consensus with all five statements ranking high on the agree side and none within disagree. In the area of flow, four of the statements reached majority agreement on the agree side of the ranking, while the other two statements ended up on the disagree side of the scale. Themes emerged within the written response segment of the study.

## Chapter 5: Conclusions and Implications

Active games can aid in obesity prevention and other related health issues (Haddock et al., 2010; Hellmich, 2011; Schiesel, 2007; Spiegel, Gill, Harbottle, & Ball, 2014). Additional positive outcomes noted include physical, psychosocial, cognitive and academic (Hellmich, 2011; Staiano & Calvert, 2011). Childhood obesity has more than doubled in children aged 6-11 in the past 30 years from 7% to nearly 18%, and quadrupled from 5% to 21% in adolescents aged 12-19 in the same time period (Ogden, Carroll, Fryar, & Flegal, 2015). Obesity continues to be an issue for today's youth, with an increased risk for cardiovascular diseases, diabetes, stroke and osteoarthritis as young adults, much younger than previous generations. Healthy lifestyles such as increased physical activity can help lower these risks (Center for Disease Control [CDC], 2016). Lifestyle choices are influenced by many factors such as; society, families, communities, schools, physical environments and media. Media consumption and an increased use of personal technologies like mobile phones, tablets, computers and game consoles are often blamed for the rise of sedentary lifestyles.

Gaming technologies have changed dramatically and are slowly being recognized as possible aides in obesity prevention. Consumers spent 23.5 billion dollars in the gaming industry in 2015 (Entertainment Software Association, 2016). Gaming via consoles, computers and mobile devices has become increasing physical with the breakthrough of sensory based technology. Yet, research on the design of active games is limited. Learning how to design games that can sustain interest and increase motivation to move is necessary.

This study seeks to fill that gap by identifying ways in which specific design mechanics and features can be used in active games. Using a Delphi study to find consensus, of game industry professionals, health practitioners and academic researchers provide feedback on the



features and mechanics which lead to well-designed active games. This chapter includes a summary of key design recommendations based on the feedback, and then closes with conclusions, limitations and possibilities for further research.

### **Review of Findings**

The study was framed around one primary question. “Which, if any, game mechanics and features can a panel of experts in academia, health and the game industry agree on as valuable and impactful to the construction of successful and engaging active games?”

Using the Delphi method, experts in active game use, research and design reached agreement on 20 of the 21 inquiries regarding game design focused on motivation, social influences and flow. The experts reached a majority criterion immediately in the sections of social influences and flow. Gaining consensus within the largest of the sections, motivation, proved to be more difficult. One statement remained split in both Rounds 1 and 2, it did not reach a consensus, and was retired with the study. “Active games should make the activity apparent, so that players can learn and acquire healthy exercise attitudes.” There are a couple of ideas for the continued split. The most obvious was having two extra participants in the second round, which complicated the study. Another interesting perspective is while the Likert tally remained split the comments helped unify ideas a bit more thoroughly. Round 1 comments were leaning more towards behavioral change and while that was somewhat repeated in Round 2, the perspectives expanded to creative engagement as being important. Once analyzed the feedback alone was not as distributed as the tally numbers, however, a split remained.

The consensus of the experts and existing literature is perhaps most useful in prescribing guidelines for design of future active games, and identifying emerging trends. While the design recommendations reflect the three key areas of research in the study—motivation, social

influences, and flow—certain themes emerged for design guidelines.

### **Agreed Upon Design Guidelines**

This research was structured around three key points on the design of active games: motivation, social influence, and flow. Motivation — how people feel when they play active games, what makes them want to play — provides an important perspective on what drives players. These are tied to social influence and flow in that they all create a synergy in a game that created engagement in the player. All three aspects are important. In conducting research with designers, researchers, and those who have implemented active games in their practice, this research captured the observations of these experts, who have been working in this field for several years. Their consensus on each of these three areas gives developers an important perspective on how to design games.

While play testing is an important part of the design process, developers can start with specific design guidelines from this research on how to begin the design of active games. Creating games can be difficult even for the most seasoned designers and developers. Most games have a base uniformity or known design strategies for game implementation such as goal setting, challenge, rewards, strategy and enjoyment. Implementing different design strategies may help bring new games to this field. The design recommendations below reflect the three key areas of research in the study—motivation, social influences, and flow—and the themes which emerged for design guidelines.

**Motivation.** In designing a game, consider what is making your player want to start playing, keep playing, and progress through personal change. Respondents highlighted the key ideas associated within motivation.

**Avatar design.** Give players control of their avatars. The avatars don't have to be

realistic, or be perfectly rendered. As learned between Rounds 1 and 2, it is more important to let the player decide what his or her avatar should look like, and allow the player to change it over time. “Many play games and enjoy playing due to the virtual world which allows one to connect with characters that are different from their own identity” – S6. Experts did not feel that making the avatar change automatically is necessary, and may do harm (such as physical changes that reflect weight change), but they agree that the player should have control over their own avatar.

***Feedback.*** Provide balanced feedback, both positive and negative. Be tactful and thoughtful in helping the player feel positively about their play experience. Another impression taken from the Delphi specifically for active games was that “failure to provide any form of feedback that would inform users of consequences to actions may result in users misunderstanding of real life situations that do result in failure” – S8. Don’t berate the player, yell at the player, or try to motivate a player by making them feel badly about themselves.

***Achievements and Leaderboards.*** Players measure their progress in games through scores and other metrics. The Delphi revealed while these are standard game features they are often missing in active games. “Consider other methods of scoring such as using physiological measures as a metric, such as heart rate change” – S8. Sharing scores and outputs on social media could be motivational to players, but should be optional.

***Personalization.*** While not necessary, it can be a nice feature to allow a player to make the game his or her own; such as calling the player by name, reflecting avatar choice. Further suggestion from the Delphi was to use “personalization with caution, as more advanced players may find this intrusive to their gameplay” – S8. Give players the option to turn this off. Personalized connections can be a novel experience for the player and encourage engagement.

***Disguising physical activity.*** Some developers may try to “hide” physical activity from

the player in the design of their games. Experts within the Delphi study agree this is unnecessary. “Players should be self-aware, and recognize the importance of physical activity and healthy paths” – S3, S5. Players should not hurt themselves through inappropriate technique or exertion. Games can increase engagement and enjoyment of physical activity, and can also help the player value a healthy lifestyle. Don’t try to distract the player from this important realization.

***Pre-defined goals on BMI.*** A trend in active games made recommendations to the player based on BMI. Experts caution against this, as it is an inconsistent measurement and does not measure fitness levels appropriately. Give players control of goal setting and provide different levels of difficulty so that they can find the right level of exertion for each own condition.

***Social Influences.*** Sociability in gaming is accomplished through online communities and in real life through group or multiplayer. It influences team work, competition and cooperation. The experts stated they were in favor of developing community based games, and were curious as to the effectiveness of social sharing within active gaming.

***Social media sharing.*** Provide an option for players to share their progress through social media. As revealed it can help validate the player’s actions and motivate them to continue playing as means of accountability. “Some people feel validated when sharing their progress in a social platform... this may lead to further motivation and accountability” – S7. Sharing was likened to another accountability effort of journaling and it is seen as positive for sustaining engagement.

***Cooperative play.*** Consider cooperative play spaces as part of your design. According to the study, while cooperative play is not a necessity, working towards collaborative goals can bring a different kind of motivation: players compete against a goal, rather than against another person. “There is plethora of evidence to support the impact of engaging in exercise that include

a social component” – S8.

**Competitive play.** Your design might benefit from using competition to enhance effort. Additionally, the Delphi reiterated that competition is an apparent aspect of our lives sports, exercise and living. “Most of the time options for competition seem to enhance effort. There is a place for non competitive as well” – S3. However, traditional exercise often includes a competitive component, transferring that to game play in a controlled environment can introduce a healthy understanding of competitive behaviors.

**Community.** Establish a place for community engagement. The study showed that creating community was a favorable approach to engagement and adherence. “Building a sense of belonging to a bigger group and identifying with others with common interest is a motivator for being active” – S8. It does not have to be in the form of multiplayer games, but rather a space for networking. When given the option to identify with a group, players can build a sense of belonging with people of common interest such as choosing to be active through game play.

**Flow.** When players enter an effortless state of engagement, and reach an optimal level of concentration, they are happiest. The world around them ceases to exist when they are deeply absorbed in their activity. Results of this survey indicated that there is room for exploration, but this may be the most difficult area within the design process, but not impossible.

**Achieving flow.** Design activities that are not overly difficult or mundane to perform. When combined with gaming the ideal would be achievable activity that is well balanced with game play according to what we learned from both rounds of the Delphi. “With an active game the two go hand and hand. It is the total experience of the activity that should be consider flow” – S4. The more conscious the player is of the physical activity, the shorter duration of play. Additionally, experts felt that the two areas, gaming and physical activity should be thought of as

a unit and not separately, but that flow will not always be achievable for both.

***Control of exercise and routines.*** Grant the player the flexibility to modify the physical activity they would like to engage in. The experts from the study suggest that adjustability will allow the player to take ownership it may engage and motivate them. “Personalizing and allowing players to choose options within the game could stimulate interest and motivate players to continue playing as they choose their exercise and routines” – S8. “Also, it demonstrates a higher level of learning and efficacy” – S7.

***Increasing difficulty.*** Integrate game progression and basic fitness principles such as frequency, intensity, time and duration. The Delphi revealed exercise adherence isn’t about physical activity getting harder and progression is an opportunity to engage in activities consistent with skill. “Increasing volume of frequency, intensity, time and type/duration should take priority over difficulty” – S7. Create opportunities such as leveling up for players to engage in activities suited to their abilities rather than increasing game difficulty.

### **Considerations for Future Research**

The purpose of this study was to define game design strategies for the development of active games. As technology continues to advance and newer active games become available a larger scale Delphi study similar to this one could be beneficial. This field continues to grow, and there will be a larger pool of experts from which to choose. The study should include a balanced group of experts with an equal number of participants from each field. A balanced group will provide the researcher with stronger opinions that seek to cover the different areas in question. For example, game designers will be able to reflect upon game design with more depth and complexity than the practitioners and researchers were able to in this study.

Most professional game developers keep up with technology trends and understand the

intricacies of design. These perspectives are invaluable to the development of enhanced active games. Had there been more game designers in this study, there may have been more clarity within the comments sections regarding design, thus providing a different perspective for the researchers and practitioners. Likewise, it would have been beneficial for game designer to gain insight from those who actually put active games into practice.

Interestingly enough, the remaining question also provides an opportunity to examine the split more thoroughly. A study examining if there are behavioral changes as a result of playing with active games both for physical fitness and pure leisure that are using current technologies. Similar one could study the other side of the split and exam engagement and sustainability of active games. For example, those that are designed explicitly for physical fitness and those created solely for play.

Another qualitative study for consideration would be case studies with actual active game players. While it was very informative to gain perspective from experts who research and implement active game spaces it is very important to not dismiss the gamers themselves. While this study was based off a more theoretical perspective of engagement, studying gamers who are actual active participants of physical games is extremely important. The researcher will gain first-hand knowledge of what the users perceive as motivating, how flow states are reached and a better understanding of social influences should one conduct a similar study. The researcher would be able to narrow down subject areas. For instance, being able to study gamers while playing specific types of active games as well as devices to align more with a human computer interaction component.

Additional follow up studies can be conducted in the areas of augmented and virtual reality (VR) for active gaming. While VR technology is not in the majority of homes just yet, it

is becoming more affordable and is now more readily available to consumers. More applications are being built and implemented fairly consistently now. There may be an increased sense of realism that could be a very interesting perspective to study especially with physically enhanced gaming.

Another area for consideration, is creating active games for mobile devices. Pokémon Go was released in the summer of 2016 just after the conclusion of this study. Games prior to Pokémon, like Ingress created by the same company Niantic Labs, and apps like Zombie Run did not see the same success. However, because of the continued success of Pokémon Go, there will be an upswing in active game design with similar types of products emerging for mobile devices. Smartphone are already able to track health data such as heart rate and steps taken. Incorporating similar types of mechanics to quest based games for mobile devices could encourage more usage for players looking for physical activity. This could lead to more health and fitness based studies using mobile technology.

While this study was not able to fully recommend quest based games, this is another area for consideration especially when games can be designed with mobile devices in mind. For example, something as simple as geocaching could even afford a redesigned, the point is opportunities for mobile questing are going to open up. Realizing that narrative and quest based games may not be enjoyed by everyone, there certainly could be a growing market for them. Games similar to Pokémon, or Ingress with a short storyline included could very well enhance active game quests to be shared with friends and family.

Some experts in the study did find quest based games as something worth exploring in future research although they were not familiar with current games such as Pokémon Go at the time. As our society continues to engage in social media any of the above suggestions for future



studies could incorporate how social media and communities are formed around active games and mobile technologies.

### **Limitations**

This study would have been strengthened with the inclusion of more game designers. While the initial list of participants included a balanced list of game designers, practitioners and academics, the request to participate was only answered by one game designer. Additionally, the study would have benefitted from a larger number of expert participants. Because of the specific timeline for the study seeking additional participants became an issue as this particular field has a limited number of known experts. Once the request to participate was sent to the select group, the one-week period for responding began.

Another area of limitation was the pilot test, which lacked a true representation of the different professions. Having had a population sample similar to the participant group may have prevented some of the confusion that seems to have occurred with some of the statements. A stronger design of the statements may have resulted from a more diverse group.

### **Research Challenges**

There were unanticipated challenges once the survey was underway. The participants remained anonymous through the entire study process, however, coding of actual subjects at the beginning of the study would have enabled reliable tracking for both rounds. Not having done so resulted in all of the original agreeing participants being emailed again in the second announcement. Sending out the second round of emails to the participants became an issue because there was an obvious shift in participants with two extra subjects joining in. There was no way of telling who opted out after having agreed, so eliminating subjects during the second round was not possible. Feedback was cohesive enough to continue, but a more thorough

tracking process would have been beneficial.

## **Conclusions**

The field has matured, there are pockets of experts in design, research and implementation. There are consistent best practices defined, however, they are not implemented in all games yet. The necessity and excitement for active gaming is still there, maintaining player enthusiasm and engagement in these types of games consistently is an issue. Through better game design and newer types of active games, a resurgence of active game players will appear. The reality is active games need to be created that incite engagement and commitment of use for extended periods of time. There are new avenues to consider, and potentially more exciting, is that these guidelines can inform developers working with newer technologies such as mobile devices, enhanced game consoles, virtual and augmented reality platforms to create active games that inspire gamers to play.

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## APPENDIX A

## IRB Approval Notice

Date: March 02, 2016

Protocol Investigator Name: Pamela Martinez

Protocol #: 16-02-210

Project Title: Active Games: An Examination of User Engagement to Define Design  
Recommendations School:

Graduate School of Education and Psychology

Dear Pamela Martinez:

Thank you for submitting your application for exempt review to Pepperdine University's Institutional Review Board (IRB). We appreciate the work you have done on your proposal. The IRB has reviewed your submitted IRB application and all ancillary materials. Upon review, the IRB has determined that the above entitled project meets the requirements for exemption under the federal regulations 45 CFR 46.101 that govern the protections of human subjects.

Your research must be conducted according to the proposal that was submitted to the IRB. If changes to the approved protocol occur, a revised protocol must be reviewed and approved by the IRB before implementation. For any proposed changes in your research protocol, please submit an amendment to the IRB. Since your study falls under exemption, there is no requirement for continuing IRB review of your project. Please be aware that changes to your protocol may prevent the research from qualifying for exemption from 45 CFR 46.101 and require submission of a new IRB application or other materials to the IRB.

A goal of the IRB is to prevent negative occurrences during any research study. However, despite the best intent, unforeseen circumstances or events may arise during the research. If an unexpected situation or adverse event happens during your investigation, please notify the IRB as soon as possible. We will ask for a complete written explanation of the event and your written response. Other actions also may be required depending on the nature of the event. Details regarding the timeframe in which adverse events must be reported to the IRB and documenting the adverse event can be found in the Pepperdine University Protection of Human Participants in Research: Policies and Procedures Manual at [community.pepperdine.edu/irb](http://community.pepperdine.edu/irb).

Please refer to the protocol number denoted above in all communication or correspondence related to your application and this approval. Should you have additional questions or require clarification of the contents of this letter, please contact the IRB Office. On behalf of the IRB, I wish you success in this scholarly pursuit.

Sincerely,

Judy Ho, Ph.D., IRB Chairperson

cc: Dr. Lee Kats, Vice Provost for Research and Strategic Initiatives

Mr. Brett Leach, Regulatory Affairs Specialist

Date: April 11, 2016

## APPENDIX B

### Expert Solicitation Request

Dear Practitioner, Academic or Gamer Designer,

My name is Pamela N. Martinez, the research study I am conducting is in partial fulfillment of the requirements for the Doctorate of Education in Learning Technologies at Pepperdine University under the supervision Dr. Linda Polin.

I would like to invite you to participate in a Delphi study focused on the relationship between game design elements in exergames, 'active games,' or 'games for health,' and their effects on player motivation, with a special focus on flow theory, and social influences.

This study is designed to seek opinions from a panel of game industry professionals, health practitioners and academics, through two or three round of questions and comments. The Delphi method provides an efficient way to develop group consensus while protecting the anonymity of individuals.

The survey should take about 30 minutes to complete. The survey is a short series of statements or questions regarding key design questions for active gaming drawn from a review of existing literature on this topic. After each statement or question, you state your level of agreement or disagreement and provide a brief comment. Comment boxes are provided for you to contribute to further discussion of each item. Items for which there is consensus are removed. First round results are summarized and, after a week or so, returned to you for a second round. This process will definitely not exceed three rounds. An executive summary of findings will be available to participants at the conclusion of the study.

Thank you for your consideration. If you are able to participate, please respond to this email. I will then send you a link to the survey. If you could recommend other potential participants for my study, I would certainly appreciate a few additional members. I will be happy to answer any questions you have about the study.

You may contact me at:

Kind Regards,

Pamela N. Martinez

## APPENDIX C

## Email to Participants – Round 1

Hello Participants Name,

Thank you for your willingness to participate in my research study and for your patience. Due to the nature of the Delphi protocol I wasn't able to send the survey out immediately after you responded. However, I now have the majority of participants and can start the data collection process accordingly.

Participants will have one week to return this survey—it should take less than 30 minutes to complete. I will take another week to analyze all the responses and ready the second survey. Upon completion, I will send the second survey. Now that the process is underway, I'm hoping to turn information around swiftly.

To begin the survey, use the link below:

Survey link:

[https://www.surveymonkey.com/r/activegames\\_dissertation](https://www.surveymonkey.com/r/activegames_dissertation)

It seems to favor Chrome and Firefox Browsers. If the link doesn't take you directly to the survey, please cut and paste it into your browser.

Again, thank you for consideration and willingness to participate in my study.

Kind regards,

Pamela N. Martinez  
Pepperdine Doctoral Candidate

## APPENDIX D

### Informed Consent Form Delphi Survey Instrument – Round 1

You are invited to participate in a research study conducted by Pamela N. Martinez, (Dr. Linda Polin, my faculty advisor) at Pepperdine University, because you are considered a leading expert in active games. Your participation is voluntary. You should read the information below, and ask questions about anything that you do not understand, before deciding whether to participate. Please take as much time as you need to read this document. You may also decide to discuss participation with your family or friends.

The Delphi study is focused on the relationship between game design elements in exergames, ‘active games,’ or ‘games for health,’ and their effects on player motivation, with a special focus on flow theory, and social influences.

This study is designed to seek opinions from a panel of game industry professionals, health practitioners and academics, through two or three round of questions and comments. The Delphi method provides an efficient way to develop group consensus while protecting the anonymity of individuals.

If you agree to take part in this study, you will be asked to participate in a survey and it should not take longer than 30 minutes. The survey is a short series of statements or questions regarding key design questions for active gaming based drawn from a review of existing literature on this topic. After each statement or question, you state your level of agreement or disagreement and provide a brief comment. Comment boxes are provided for you to contribute to further discussion of each item. Items for which there is consensus are removed. First round results are summarized and, after a week or so, returned to you for a second round. This process should not exceed three rounds. An executive summary of findings will be available to participants at the conclusion of the study.

Your participation is voluntary. Your refusal to participate will involve no penalty or loss of benefits to which you are otherwise entitled. You may withdraw your consent at any time and discontinue participation without penalty. You are not waiving any legal claims, rights, or remedies because of your participation in this research study.

Your alternative if you choose is to not participate in the study.

I will keep your records for this study anonymous as far as permitted by law. However, if I am required to do so by law, I may be required to disclose information collected about you. Examples of the types of issues that would require me to break confidentiality are if you tell me about instances of child abuse and elder abuse. Pepperdine’s University’s Human Subjects Protection Program (HSPP) may also access the data collected. The HSPP occasionally reviews and monitors research studies to protect the rights and welfare of research subjects.

The data will be stored on a password-protected computer in the principal investigators

computer. Any identifiable information obtained in connection with this study will remain confidential. The survey participants will not be identified within the survey itself. The data will be stored for a minimum of three years.

I understand that the investigator is willing to answer any inquiries I may have concerning the research herein described. I understand that I may contact Pamela N. Martinez and Dr. Linda Polin if I have any other questions or concerns about this research.

If you have questions, concerns or complaints about your rights as a research participant or research in general please contact Dr. Judy Ho, Chairperson of the Graduate & Professional Schools Institutional Review Board at Pepperdine University 6100 Center Drive Suite 500 Los Angeles, CA 90045, 310-568-5753 or [gpsirb@pepperdine.edu](mailto:gpsirb@pepperdine.edu).

If you would like documentation of your participation in this research you may print a copy of this form.

By clicking on the link to the survey questions, you are acknowledging you have read the study information. You also understand that you may end your participation at end time, for any reason without penalty.

You agree to participate.

You choose not to participate.

### **1. Please identify your primary role in regards to active gaming.**

Practitioner

Researcher

Game Designer

It would be very helpful if you could please proceed with the survey keeping your identified primary role at the forefront.

### **Design Regarding Motivation**

Motivation is what prompts people to engage in some type of activity. In gaming, what motivates gamers to play comes from many different influences and perspectives. The following section centers around motivation and how it may influence active game design.

### **2. Avatars should realistically represent the player's body type, shape, weight and height — including changing over time as the player's body changes.**

Strongly Disagree, Disagree, Agree Strongly, Agree, No Opinion

Please briefly explain your choice.

### **3. Feedback in active games should always be positive, thoughtful and encouraging without**



**criticism.**

Strongly Disagree, Disagree, Agree Strongly, Agree, No Opinion

Please briefly explain your choice.

**4. Game characters in-game should push players to do more and set higher goals as a way of encouraging continued progress towards the next goal.**

Strongly Disagree, Disagree, Agree, Strongly Agree, No Opinion

Please briefly explain your choice.

**5. Active games should engage with the player on a personal level using information for welcoming back players by name, maintaining friendly dialogue, or making personal suggestions.**

Strongly Disagree, Disagree, Agree, Strongly Agree, No Opinion

Please briefly explain your choice.

**6. Active games should offer player achievements such as unlocking levels, generating scores and leader boards.**

Strongly Disagree, Disagree, Agree, Strongly Agree, No Opinion

Please briefly explain your choice.

**7. Active games should hide the fact that they \* are exercise based.**

Strongly Disagree, Disagree, Agree, Strongly Agree, No Opinion

Please briefly explain your choice.

**8. Active games should make the activity apparent, so that players can learn and acquire healthy exercise attitudes.**

Strongly Disagree, Disagree, Agree, Strongly Agree, No Opinion

Please briefly explain your choice.

**9. Active games should embed workout activities in quest \* or story lines.**

Strongly Disagree, Disagree, Agree, Strongly Agree, No Opinion

Please briefly explain your choice.

**10. Goals should be set by the game for the player once BMI measurements are acquired.**

Strongly Disagree, Disagree, Agree, Strongly Agree, No Opinion  
Please briefly explain your choice.

**11. The player must be able to modify goals and level of difficulty of intensity.**

Strongly Disagree, Disagree, Agree, Strongly Agree, No Opinion

Please briefly explain your choice.

**Design Regarding Social Influences**

Video gaming in most regards has become a very social activity. Sociability in gaming is accomplished through online communities and in real life; it also influences teamwork and competition. The following section centers around social influences and how they may influence active game design.

**12. Active game should allow players to share progress with others via social media apps such as Twitter, Facebook and Instagram.**

Strongly Disagree, Disagree, Agree, Strongly Agree, No Opinion

Please briefly explain your choice.

**13. Active games should support cooperative play options.**

Strongly Disagree, Disagree, Agree, Strongly Agree, No Opinion

Please briefly explain your choice.

**14. Active games should support competitive play options.**

Strongly Disagree, Disagree, Agree, Strongly Agree, No Opinion

Please briefly explain your choice.

**15. Social accountability in active games, through sharing goals with others and posting daily progress, makes players work harder.**

Strongly Disagree, Disagree, Agree, Strongly Agree, No Opinion

Please briefly explain your choice.

**16. Active games developers should build community around multiplayer active games.**

Strongly Disagree, Disagree, Agree, Strongly Agree, No Opinion

Please briefly explain your choice.

**Design Regarding Flow**

People are at their happiest when they are at their optimal level of concentration. An absorption so deep the world around ceases to exist. This effortless state of engagement is referred to as 'flow'. The following section centers around flow activities and how they may influence active game design.

**17. For active games a primary goal is to associate the desirable 'flow' state with exercising, not with gaming.**

Strongly Disagree, Disagree, Agree, Strongly Agree, No Opinion

Please briefly explain your choice.

**18. To help players achieve 'flow' designers should make players set personal overall goals such as losing weight, running faster or personal best.**

Strongly Disagree, Disagree, Agree, Strongly Agree, No Opinion

Please briefly explain your choice.

**19. Active games should allow players to cultivate chances for enjoyment, for example mix and matching exercise or creating their own routines.**

Strongly Disagree, Disagree, Agree, Strongly Agree, No Opinion

Please briefly explain your choice.

**20. Active games should provide players with information about their performance during play.**

Strongly Disagree, Disagree, Agree, Strongly Agree, No Opinion

Please briefly explain your choice.

**21. As players concentrate harder and continue to acquire skills, gameplay should become increasingly difficult.**

Strongly Disagree, Disagree, Agree, Strongly Agree, No Opinion

Please briefly explain your choice.

**22. Active games should help players choose challenging levels of play.**

Strongly Disagree, Disagree, Agree, Strongly Agree, No Opinion

Please briefly explain your choice.

## APPENDIX E

## Email to Participants – Round 2

Hello Participants Name,

Thank you for your engagement, and welcome to round two. Fifteen of the twenty-one questions were retired because the majority of participants were in somewhat of an agreement. The six remaining questions resulted in a split, so I would like for you to reconsider them. Some people chose “no opinion,” and I would really appreciate, if possible, if you could bring yourself to an opinion. The survey includes some of the comments people made supporting their opinions for each remaining question.

I sincerely appreciate your time Participants Name, especially with such a busy schedule.

Here is the link to Round 2:

[https://www.surveymonkey.com/r/activegaming\\_round2](https://www.surveymonkey.com/r/activegaming_round2)

Kind Regards,

Pamela N. Martinez  
Pepperdine Doctoral Candidate

## APPENDIX F

## Delphi Survey Instrument – Round 2 (Final)

Thank you for your engagement and welcome to round two. Fifteen of the twenty-one questions were retired because the majority of participants were in somewhat of an agreement. The six remaining questions resulted in a split, so I would like for you to reconsider them. Some people chose, no opinion, and I would really appreciate if possible you could see yourself to an opinion. *Please take a look at some of the comments people made supporting their opinion for each remaining question.*

The following questions were retired as majority results rested closely with strongly agree or strongly disagree.

**Q4 Feedback in active games should always be positive, thoughtful and encouraging without criticism.**

*71.43% Disagree*

**Q5 Feedback in active games should always be positive, thoughtful and encouraging without criticism.**

*71.43% Agree / Strongly Agree*

**Q6 Active games should engage with the player on a personal level using information for welcoming back players by name, maintaining friendly dialogue, or making personal suggestions.**

*85.71% Agree / Strongly Agree*

**Q7 Active games should offer player achievements such as unlocking levels, generating scores and leader boards.**

*85.71% Agree / Strongly Agree*

**Q8 Actives games should hide the fact that they are exercise based.**

*71.43% Disagree / Strongly Disagree*

**Q12 The player must be able to modify goals and level of difficulty of intensity.**

*85.71% Agree / Strongly Agree*

**Q13 Active game should allow players to share progress with others via social media apps such as Twitter, Facebook and Instagram.**

*71.43% Agree*

**Q14 Active games should support cooperative play options.**

*71.43% Agree / Strongly Agree*

**Q15 Active games should support competitive play options.**

*71.43% Agree / Strongly Agree*

**Q17 Active games developers should build community around multiplayer active games.**

*71.43% Agree / Strongly Agree*

**Q19 To help players achieve 'flow' designers should make players set personal overall goals such as losing weight, running faster or personal best.**

*71.43% Disagree / Strongly Disagree*

**Q20 Active games should allow players to cultivate chances for enjoyment, for example mix and matching exercise or creating their own routines.**

*85.72 % Agree / Strongly Agree*

**Q21 Active games should provide players with information about their performance during play.**

*85.71% Agree / Strongly Agree*

**Q22. As players concentrate harder and continue to acquire skills, gameplay should become increasingly difficult.**

*85.71% Agree / Strongly Agree*

**Q23 Active games should help players choose challenging levels of play.**

*71.43% Agree*

## **Design of Active Games – Round 2**

**1. Please identify your primary role in regards to active gaming.**

- Practitioner
- Researcher
- Game Designer

It would be very helpful if you could please proceed with the survey keeping your identified primary role at the forefront.

### **Design Regarding Motivation**

Motivation is what prompts people to engage in some type of activity. In gaming, what motivates gamers to play comes from many different influences and perspectives. The following section centers around motivation and how it may influence active game design.

Strongly Disagree, Disagree, Agree, Strongly Agree, No Opinion

Please briefly explain your choice.

**2. Avatars should realistically represent the player's body type, shape, weight and height — including changing over time as the player's body changes.**

*Comments for your consideration:*

- *Strongly Disagree: The wonderful world of digital games is that the player has the ability to control their images and be who and what they want to be in the digital space. If the avatar is restricted to the person this may result in disengagement as some may not want to be reminded of their somatotype.*
- *Agree: Would give a sense of realism and motivation to the user, allowing the user to be more engaged with their avatar.*

Strongly Disagree, Disagree, Agree, Strongly Agree, No Opinion

Please briefly explain your choice.

### **3. Active games should make the activity apparent, so that players can learn and acquire healthy exercise attitudes.**

*Comments for your consideration:*

- *Agree: Better to be upfront with the user*
- *Agree: Health behaviors should be positive and we should learn to measure them*
- *Agree: Ideally, the game is a gateway to an overall healthy lifestyle.*

Strongly Disagree, Disagree, Agree, Strongly Agree, No Opinion

Please briefly explain your choice.

### **4. Active games should embed workout activities in quest or story lines.**

*Comments for your consideration:*

- *Agree: Narratives have been used as a way to initiate and sustain interest. Whilst active games have created a buzz and interest sustainability has been an issue. This is similar to the stealth approach above and as mentioned needs to be addressed according to the target population.*
- *Disagree: Dance Dance Revolution or EyeToy Kinetic never had narratives, per se.*

Strongly Disagree, Disagree, Agree, Strongly Agree, No Opinion

Please briefly explain your choice.

### **5. Goals should be set by the game for the player once BMI measurements are acquired.**

*Comments for your consideration:*

- *Strongly Disagree: Whilst BMI has been used to identify people at risk for certain diseases it is not always a good measure for identifying risk or change. The level of change is also an issue in this case as change in BMI can take a long time and if there is not change in this parameter quickly then adherence may be affected.*
- *Disagree: BMI doesn't tell the whole story. They may have a high lean weight. Obviously measuring body fat might be difficult to input, but I believe in focusing on fitness.*



Strongly Disagree, Disagree, Agree, Strongly Agree, No Opinion

Please briefly explain your choice.

### **Design Regarding Social Influences**

Video gaming in most regards has become a very social activity. Sociability in gaming is accomplished through online communities and in real life; it also influences teamwork and competition. The following section centers around social influences and how they may influence active game design.

#### **6. Social accountability in active games, through sharing goals with others and posting daily progress, makes players work harder.**

*Comments for your consideration:*

- *Agree: Not always, but framed effectively, could be a greater incentive than not having any social accountability.*
- *Disagree: Yes and no... depends on the person.*
- *Agree: Some are intrinsically motivated, but this will help many.*

Strongly Disagree, Disagree, Agree, Strongly Agree, No Opinion

Please briefly explain your choice.

### **Design Regarding Flow**

People are at their happiest when they are at their optimal level of concentration. An absorption so deep the world around ceases to exist. This effortless state of engagement is referred to as 'flow'. The following section centers around flow activities and how they may influence active game design.

#### **7. For active games a primary goal is to associate the desirable 'flow' state with exercising, not with gaming.**

*Comments for your consideration*

- *Strongly Agree: Both exercise and gaming are capable of producing a "flow state" which may be compounded or more easily achieved if both are combined. Emphasis should be placed on keeping these activities at a level that allows the participant to be challenged but continue to play without disruption.*
- *Strongly Disagree: Anything that takes the player out of the game world ("presence") is disruptive.*

Strongly Disagree, Disagree, Agree, Strongly Agree, No Opinion

Please briefly explain your choice.

## APPENDIX G

## Survey Responses - Round 1 and Round 2

*Avatars and Body Shape**Comments on Statement 3, Round 1 and Round 2**(Corresponds to Table 1)*

Likert Ranking	Comments	Survey Round
Strongly Disagree	The wonderful world of digital games is that the player has the ability to control their images and be who and what they want to be in the digital space. If the avatar is restricted to the person this may result in disengagement as some may not want to be reminded of their somatotype. – S8	1
Disagree	Folks want their ideal! A master or a kind of modified god or goddess, not the true self – S5	1
Disagree	The answer could be yes or no, depending on the game and its goals. Many players prefer idealized versions of themselves represented as avatars (think superhero games). On the other hand, having a character's body reflect diet and physical activity is good way to portray cause and effect. – S2	1
Agree	Would give a sense of realism and motivation to the user, allowing the user to be more engaged with their avatar. – S6	1
Agree	You may want to consider not showing weight gain. – S4	1
Agree	I don't believe this is crucial, but certainly helpful. I haven't seen data on this, but I would assume it would help motivate the player. – S3	1
Agree	No comment – S7	
<hr/>		
Round 2		
Disagree	I don't think this is necessary. It is fine, but I don't believe essential. – S9	2
Disagree	People want to STRIVE for a certain image. In the land of selfies, most want to look a little better – S8	2
Disagree	I think it depends on the player's preference, whatever	2

motivates them to play the game. Perhaps some people do not like the way that they look and would rather "be someone else" in a game. – *S7*

- |                   |   |   |
|-------------------|---|---|
| Strongly Disagree | Based on observations from lab and ecological studies in a multicultural setting it would be a disservice to restrict game options to represent an individual's body type. Many play games and enjoy playing due to the virtual world which allows one to connect with characters that are different from their own identity. This allows one to explore other cultures, identities and possibly understand differences. – <i>S6</i>  | 2 |
| Agree             | I think that in most cases this would be a great choice for players, however some players may want their avatar to be more of a fantasy character. I think whatever it takes to motivate the kids to play should be an option and if that is allowing choices, we should allow for that. – <i>S5</i>  | 2 |
| Disagree          | Depends on the game. I do not think every game warrants this intense of an avatar. Some people may want to create a different "them". – <i>S4</i>   | 2 |
| Disagree          | There's no such thing 'real' representation in digital games. If the goal is motivation, the designer should focus more on flow and game elements and not whether or not the avatar should look 'real' like the player. You should have the freedom to make your avatar as 'real' or as non-representative as you wish. In the board game LIFE, the pieces you play don't look like real human beings either. They are pegs. Does that mean the game isn't as engaging or motivating or fun to play? – <i>S3</i>  | 2 |
| Strongly Disagree | Creating an idealized version of self is one of the primary reasons players enjoy avatar-based games. – <i>S2</i>   | 2 |
| Disagree          | I don't think active games "should" or "must" do many of the things you describe. They "could" do those things when the situation merits it, and it can be a powerful design strategy for some, but there is not just one way to design an active game. I disagree with item #2 above because there are some people in some situations who might benefit from seeing their appearance, weight, and height represented in a game, and other people in other situations who would not benefit or might become discouraged or lose self-esteem if they saw their appearance, weight, and height represented in a game. Games are designed to meet the specific needs of the individual player or of the target population in general. So, I disagree with item #2 because you are asking about "should." – <i>S1</i> | 2 |
-

*Feedback in Active Games**Comments on Statement 4, Round 1**(Corresponds to Table 2)*

Likert Ranking	Comments	Survey Round
Disagree	The advantage of video games is that feedback can be controlled using constructive methods unlike some situations with human interaction. Failure to provide any form of feedback that would inform users of consequences to actions may result in users misunderstanding of real life situations that do result in failure. – S8	1
Disagree	There has to be good balance between positive feedback and constructive criticism, favoring the thoughtfulness and encouragement of the feedback. – S7	1
Disagree	I don't think we need to be afraid of negative feedback, if done in the appropriate way. – S6	1
Disagree	Game feedback is usually very honest and direct. – S4	1
Disagree	I believe tactful honesty is actually a good thing – S3	1
Agree	We like the pos, but have to have a little negative (but not chiding, sarcastic, nasty) – S5	1
Strongly Agree	Negative feedback is as important as positive. Only positive feedback will be viewed as pandering and not taken seriously. – S2	1

*Game Challenge**Comments on Statement 5, Round 1**(Corresponds to Table 3)*

Likert Ranking	Comments	Survey Round
Agree	I believe that to be appropriate motivation – <i>S6</i>	
Agree	Generally yes, but maintenance is not always a bad thing. – <i>S3</i>	1
Agree	No Comment – <i>S7</i>	1
Strongly Agree	Levels in games not only provide a way for a player to engage in the game and sustained game play but this also allows players to understand active participation in achievement. – <i>S8</i>	1
Strongly Agree	Want to push people a bit, give hints, unlock for momentum – <i>S5</i>	1
No Opinion	Depends on the context. – <i>S4</i>	1
No Opinion	Higher than what? Goals should be tailored to individuals' current condition, likes and dislikes. – <i>S2</i>	1

## Personal Connection

*Comments on Statement 6, Round 1**(Corresponds to Table 4)*

Likert Ranking	Comments	Survey Round
Agree	Introducing a personal connection and a personal identifier may create a novel experience for the player. However, this may be used with caution or if possible a selective button to turn on or off this application as some more advanced players may find this to be intrusive and obstructive to their game play. – S8	1
Agree	Don't waste players' time with too much friendly chatter that is not central to the game. – S4	1
Agree	Again, generally I agree, but I don't think this is crucial. I doubt it would have a major impact compared to other factors in the same. – S3	1
Strongly Agree	Making it personalized will engage the user more – S6	1
Strongly Agree	Nice to see you back, that kind of thing helps Not like the old Wii, you have not BEEN HERE IN 38 days, your bmi sucks, etc – S5	1
Strongly Agree	No Comment – S7	1
No Opinion	Nice, but not necessary. – S2	1

*Player Achievements**Comments on Statement 7, Round 1**(Corresponds to Table 5)*


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Likert Ranking	Comments	Survey Round
Strongly Disagree	This is how players measure their progress in a game. – S2	1
Agree	That's pretty standard gamification stuff... – S6	1
Agree	Opt in or out of social media – S5	1
Strongly Agree	A achievable challenge is beneficial. – S3	1
Strongly Agree	This seems to be missing in most games and would certainly be a novel addition to active games. Perhaps some form of scoring based on physiological parameters such as heart rates may also be interesting? – S8	1
Strongly Agree	No comment – S4	1
Strongly Agree	No comment – S7	1

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*Exercised Based**Comments on Statement 8, Round 1**(Corresponds to Table 6)*

Likert Ranking	Comments	Survey Round
Strongly Disagree	No Comment – S4	1
Disagree	Users will know so why try and hide it? – S6	1
Disagree	Nope, people need to be self aware and monitor – S75	1
Disagree	They will figure it out anyway. – S3	1
Disagree	Nothing wrong with being honest, but the game has to be compelling first. A boring stealth health game is nonstarter. – S2	1
No Opinion	This would be based on the situation. If you are working with an individual that has limited interest in exercise then stealth based active games may be required. This may be particularly important for children whom enjoy playing and engaging in forms of activity simultaneously as done in traditional exercise related activities (e.g. tag). However, there are some individuals that enjoy exercising and playing games and would benefit from knowing that they are involved in some form of exercise. – S8	1
No Opinion	If the game is motivating and fun, whether or not is 'exercise-based' may not be an issue for the player. – S7	1



*Physical Activity and Healthy Attitudes**Comments on Statement 9, Round 1 and Round 2**(Corresponds to Table 7)*

Likert Ranking	Comments	Survey Round
Agree	Better to be upfront with the user – S6	1
Agree	Health behaviors should be positive and we should learn to measure them – S5	1
Agree	Ideally, the game is a gateway to a overall healthy lifestyle. – S3	1
Agree	No comment – S7	1
No Opinion	As stated in question 7 this would be based on the situation/player. An older player that is participating in the active game for rehab purposes may be more interested in learning about health and well being in relation to his/her exercise whereas a child using the same platform may not be interested in this form of feedback. – S8	1
No Opinion	The question is unclear and it is double-barrelled. – S4	1
No Opinion	Depends on the game. – S2	1
<hr/> Round 2 <hr/>		
Strongly Disagree	I do not think we hide exercise but I think if someone is having fun everything does not have to educational. – S4	2
Strongly Disagree	The stealthier the message, the more opportunity there is for fun to take center stage. Too many health video games wear their "this is good for you, so stop complaining and just do it" message on their sleeve. Health care providers, teachers, parents and other authority figures might want to see "good for you" messages up front, but likely not players (especially children). Players play video games, including serious/active video games, for fun. If fun takes a backseat to a wagging finger, players tune out. – S2	2
Disagree	Sometimes I think it is not good to bring it up, just have fun – S8	2
Disagree	We are already blasted with many messages of health and exercise in our lives... do we really need one more platform (of what could be an enjoyable outlet for someone) to re-enforce this message, too? – S3	2

Agree	Health behaviors are learned and ideally active gaming is a gateway to other activities. – <i>S7</i>	2
Agree	No Comment – <i>S1</i>	2
Strongly Agree	They need to see what they are actually doing. – <i>S9</i>	2
Strongly Agree	I think that fostering life-long physical activity skills and the confidence to be physically active. – <i>S5</i>	2
No Opinion	This is would highly depend on the game and target audience. For some stealth fitness is required. In every other aspect of fitness there is a push for individualized prescription and active games should be no different. – <i>S6</i>	2

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*Quests and Storylines:**Comments on Statement 10, Round 1 and Round 2**(Corresponds to Table 8)*

Likert Ranking	Comments	Survey Round
Disagree	Dance Dance Revolution or EyeToy Kinetic never had narratives, per se. – S7	1
Agree	Narratives have been used as a way to initiate and sustain interest. Whilst active games have created a buzz and interest sustainability has been an issue. This is similar to the stealth approach above and as mentioned needs to be addressed according to the target population. – S8	1
Agree	Like having little challenges along the way – S6	1
Strongly Agree	Narrative wins the day, our brains are made to listen for a story (google narrative medicine) – S5	1
No Opinion	Depends on the goals and context of the game. there are many ways to design an active game, so I would never say that the game "should" embed workout activities. – S4	1
No Opinion	I could go either way. I don't agree or disagree – S3	1
No Opinion	Quest yes, but not necessarily a story. Sometimes in-game storytelling is distracting. Our experience is to tell the game's story outside of the game through conventional media (short story, novella, novel, film, etc.), and then let the play experience the storied world as a game. – S2	1
<hr/> Round 2 <hr/>		
Strongly Disagree	I think this can be an option, but active games can also be dance or sport-related as well. – S5	2
Disagree	It is fine to have a story line, but I don't think it is essential in order to get a good workout. – S9	2
Disagree	Active Games are a category of games. Not all games have to be created the same. Depends on the content and exercise type of the game. – S4	2
Disagree	Games like DDR, Dance Central and some of the Wii games never had story lines, but are very popular and promote physical activity. – S7	2

Disagree	Quest and story lines can be highly motivating, but they are not necessary for a game to be effective, so I disagree that they "should" be used. – <i>S1</i>	2
Disagree	No comment – <i>S3</i>	2
Agree	Agree with the agree comment above. EyeToy Kinetic and DDR do not compare to the attraction and adherence noted in commercial games. One of the main differences between the two game platforms is the storyline underlying the commercial games. A comparison between story based active games and those active games without a narrative foundation would be interesting to investigate. – <i>S6</i>	2
Agree	Narrative is key, a la Tom Baranowski, but also it is OK to have some workouts for choice – <i>S8</i>	2
Strongly Agree	DDR, Wii and other non-narrative games wear out their welcome in a few weeks. A continuing narrative is one way to keep players coming back for more. – <i>S2</i>	2

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*Pre-Defined Goals and BMI:**Comments on Statement 11, Round 1 and Round 2**(Corresponds to Table 9)*

Likert Ranking	Comments	Survey Round
Strongly Disagree	Whilst BMI has been used to identify people at risk for certain diseases it is not always a good measure for identifying risk or change. The level of change is also an issue in this case as change in BMI can take a long time and if there is not change in this parameter quickly then adherence may be affected. – S8	1
Strongly Disagree	BMI's are an inconsistent base measurement of health or fitness. – S7	1
Disagree	BMI doesn't tell the whole story. They may have a high lean weight. Obviously measuring body fat might be difficult to input, but I believe in focusing on fitness. – S3	1
Disagree	BMI is a term that turns folks OFF – S5	1
No Opinion	Depends on the context. Not a necessary feature, but it could be effective in some games. – S4	1
No Opinion	Not sure about that... – S6	1
No Opinion	Depends on the game. In general, goals should be tailored to the game player, but measuring BMI isn't part of every active game. – S2	1
<hr/>		
Round 2		
Strongly Disagree	As mentioned above BMI is not a good measure to identify obesity. BMI is also ethnically different so if BMI was as a goal then the game would also need to require the player to identify their ethnic profile and perhaps other personal details. – S6	2
Strongly Disagree	BMI is not accurate. – S4	2
Strongly Disagree	Goal setting should be highly tailored to players likes/dislikes and current activities, not just BMI. For example, if a player is already walking a mile to school everyday, there's no sense in game assigning a "walk a mile every day" goal. Instead, players should be able to select from a menu of goals, filtered by current actives and preferences. – S2	2

Disagree	BMI is only one thing we look at. Besides it has it's own limitations. – <i>S9</i>	2
Disagree	BMI is not the only game in town. When the old Mii games showed my BMI, I felt like epic fail – <i>S8</i>	2
Disagree	BMI is only one indicator of health. Goals should be set on the physical activity behavior itself, not the outcome of weight loss. – <i>S7</i>	2
Disagree	No comment – <i>S1</i>	2
Disagree	No Comment – <i>S3</i>	2
Agree	We want kids of all BMIs to be active. While weight loss may be one goal, meeting PA recommendations, etc are also equally important. – <i>S5</i>	2

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*Player Control**Comments on Statement 12, Round 1**(Corresponds to Table 10)*

Likert Ranking	Comments	Survey Round
Disagree	Depends on the context. Not a necessary feature, but it could be effective in some games. – S4	1
Agree	A sense of control and/or choice stimulates engagement in activity. This also personalizes the activity for each player and is beneficial for those players who are limited by their anatomical or physiological disabilities (e.g. heart patients, pregnant women). – S8	1
Agree	It helps to give players some sense of control... – S6	1
Agree	Kind of like a threshold should be set---some will start from a higher level, some need basics – S5	1
Agree	Goals are often not accomplished, and for various reasons. The game could review uncompleted goals with the player and solutions offered to overcome barriers, or goals changed to something more realistic for the player. – S2	1
Strongly Agree	Some days they just don't feel as well. – S3	1
Strongly Agree	No comment – S7	1

*Social Media and Sharing**Comments on Statement 13, Round 1**(Corresponds to Table 11)*

Likert Ranking	Comments	Survey Round
Agree	As mentioned, social media influences behavior and should be included as an alternative to active games in a secure setting. – S8	1
Agree	Some people feel validated when sharing their progress in a social platform... this may lead to further motivation and accountability. The option to share to a user's online community should be available. – S7	1
Agree	I believe that should be an option, but not a default option. If they want to be private about it, they should have that option as well. – S6	1
Agree	Choice here I do not want my kids names out there – S5	1
Agree	Allow yes, not require - it would be interesting to evaluate how many people did if it was available. – S3	1
No Opinion	Depends on the context. Not a necessary feature, but it could be effective in some games. – S4	1
No Opinion	Depends on the game. – S2	1



*Cooperative Play**Comments on Statement 14, Round 1**(Corresponds to Table 12)*


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Likert Ranking	Comments	Survey Round
Agree	Should support but not make it mandatory. – S6	1
Agree	I Amanda Staiono's research supports this – S5	1
Agree	There seems to be a place for both independent and cooperative – S3	1
Strongly Agree	No Comment – S7	1
Strongly Agree	There is plethora of evidence to support the impact of engaging in exercise that include a social component. – S8	1
No Opinion	Depends on the game. Some games are better as personal journeys rather than multi-player competitions. – S2	1
No Opinion	Depends on the context. Not a necessary feature, but it could be effective in some games. – S4	1

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*Competition**Comments on Statement 15, Round 1**(Corresponds to Table 13)*

Likert Ranking	Comments	Survey Round
Agree	Traditional sport and exercise as well as everyday living includes competition. Including competition in active games not only provides an opportunity for the player to learn about competition but it can also be controlled in the game to ensure that the aspects of competitive behavior are learned in a healthy environment, which highlights why games are so powerful and productive for learning! – S8	1
Agree	Believe it's a good option for certain people. – S6	1
Agree	We are Americans for God's sake – S5	1
Strongly Agree	Most of the time options for competition seem to enhance effort. There is a place for non competitive as well. – S3	1
Strongly Agree	No comment – S7	1
No Opinion	Depends on the context. Not a necessary feature, but it could be effective in some games. – S4	1
No Opinion	Depends on the game. – S2	1

*Social Accountability**Comments on Statement 16, Round 1 and Round 2**(Corresponds to Table 14)*

Likert Ranking	Comments	Survey Round
Disagree	Yes and no...depends on the person. – S6	1
Agree	Not always, but framed effectively, could be a greater incentive than not having any social accountability. – S7	1
Agree	This is evidence based – S5	1
Agree	Some are intrinsically motivated, but this will help many. – S3	1
No Opinion	Unknown, although this would make a good research topic. – S2	1
No Opinion	For some this may be a motivator whilst others may feel degraded by not having "made the grade". As mentioned previously, personalization of this feature may be warranted. – S8	1
No Opinion	This works for some players but not all players. – S4	1
<b>Round 2</b>		
Agree	It varies, some this will help and others no. – S9	2
Disagree	Sometimes-- but some kids in my focus groups do not want to share – S8	2
Agree	I think this is the accountability component, similar to journaling, etc. – S5	2
Agree	I say agree and disagree. I think it can be a very effective aspect. – S4	2
Agree	Some people will choose not to play the game if they are forced to post their daily progress or if the game posts their progress automatically. You could make it optional. – S1	2
Agree	No comment – S3	2
Agree	No comment – S7	2
No Opinion	If the game is being played in a country where cooperation is strongly encouraged and valued then sharing goals with each other may prove to be a motivator. However, if competition is valued in a society then progress may promote usage and	2

increase effort when playing. – *S6*

No Opinion    Yes and no. Depends on the game and the player. – *S2*                      2

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*Community:**Comments on Statement 17, Round 1**(Corresponds to Table 15)*

Likert Ranking	Comments	Survey Round
Agree	Building a sense of belonging to a bigger group and identifying with others with common interest is a motivator for being active and therefore would be a novel addition to the active gaming space. – S8	1
Agree	This can be helpful in some cases. I wouldn't say all games need this. – S3	1
Agree	But not make all games multi-player. Some may want to do their own thing. – S6	1
Agree	For some, this will inspire – S5	1
Strongly Agree	Yes. Yes. Yes. Community is core to any company or product - not an afterthought or an extension of marketing. If relationships is key in exercise adherence, then online communities have the ability to enhance relationships IRL. – S7	1
No Opinion	Depends on the context. Not a necessary feature, but it could be effective in some games. – S4	1
No Opinion	Depends on the game. – S2	

*Achieving Flow:**Comments on Statement 18, Round 1 and Round 2**(Corresponds to Table 16)*

Likert Ranking	Comments	Survey Round
Strongly Disagree	Anything that takes the player out of the game world ("presence") is disruptive. – S2	1
Disagree	I just don't think this is completely realistic or easy to evaluate. – S3	1
Agree	But not every day will bring nirvana – S5	1
Strongly Agree	Both exercise and gaming are capable of producing a "flow state" which may be compounded or more easily achieved if both are combined. Emphasis should be placed on keeping these activities at a level that allows the participant to be challenged but continue to play without disruption. – S8	1
No Opinion	Haven't really thought much about this, but this is an interesting question. The equivalent of 'flow' in gaming might be similar to a 'runner's high' in exercise. But with active games, depending on the user... their gaming endurance versus exercise endurance are not mutually exclusive and may not always be stimulated by the same triggers. – S7	1
No Opinion	Hmmm, I don't know about that.... – S6	1
No Opinion	Depends on the context. Not a necessary feature, but it could be effective in some games. – S4	1
<b>Round 2</b>		
Strongly Disagree	My initial answer was strongly agree but should have been Strongly Disagree as noted by my Strongly Agree comments above "flow" is associated with both and should not be identified specifically with either gaming or activity. – S6	2
Strongly Disagree	The more conscious the player is of the physical activity, the shorter duration they'll spend doing it. (Ever try jogging or using an elliptical machine without and earbuds and an iPod? For more than five minutes? Can't be done. ) – S2	2
Disagree	It is not bad to just exercise for the purpose of exercising. It is nice to be able to focus on the flow, but not crucial for all games. – S9	2

Disagree	With and active game the two go hand and hand. It is the total experience of the activity that should be consider "flow". If one does not exist with the other you can not reach a flow state. – <i>S4</i>	2
Disagree	No comment – <i>S3</i>	2
Disagree	No comment – <i>S7</i>	2
Agree	Nice, when you can get it but not the end all-- plus, if a parent has to say "Johnny,time for dinner, turn that thing off..." you don't want to pluck them from nirvana to have my boring dinner – <i>S8</i>	2
Agree	Both are important. – <i>S5</i>	2
Agree	No comment – <i>S1</i>	2

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*Achieving Flow and Personal Goals**Comments on Statement 23, Round 1**(Corresponds to Table 17)*

Likert Ranking	Comments	Survey Round
Strongly Disagree	Sound pretty heavy-handed and overt, to me, and a likely turn-off to game players. – S2	1
Disagree	Flow state occurs when an individuals skill is equal to the challenge presented. Goals may be set with expectations that do not meet personal skills or possibilities (over achievers) which would then negate any possible ability for a player to connect his/her skill with the prospective challenge. – S8	1
Disagree	No comment – S7	1
Disagree	Goal setting is very cognitive Flow is very intuitive – S5	1
Disagree	A game can be compelling even if the game sets goals and players do not set personal goals. – S4	1
Agree	Help the players set their own goals - with reasonable guidance. – S3	1
Agree	That would seem to make sense – S6	1



*Controlling Exercise and Routines**Comments on Statement 20, Round 1**(Corresponds to Table 18)*

Likert Ranking	Comments	Survey Round
Agree	Enjoyment is a contributing factor for engagement in exercise and in digital games. Personalizing and allowing players to choose options within the game could stimulate interest and motivate players to continue playing as they choose their exercise and routines. – S8	1
Agree	Flexibility could help, but it is likely not critical. – S3	1
Agree	That kind of modding would be preferable – S6	1
Strongly Agree	Fun wins – S5	1
Strongly Agree	Yes, allowing some flexibility on the part of the gamer is a great way to take ownership -- it demonstrates learning, which in term can lead to higher levels of efficacy. – S7	1
Strongly Agree	No comment – S2	1
No Opinion	Depends on the context. Not a necessary feature, but it could be effective in some games. – S4	1

*Performance Feedback**Comments on Statement 2, Round 1**(Corresponds to Table 19)*

Likert Ranking	Comments	Survey Round
Agree	Feedback during play is usually motivating – S6	1
Agree	Feedback is a must – S5	1
Strongly Agree	Feedback will help them, for instance they need to know why they are not passing a certain level. – S3	1
Strongly Agree	No comment – S2	1
Strongly Agree	No comment – S4	1
Strongly Agree	No comment – S7	1
No Opinion	This choice would depend on the player and situation. An advanced player may find the constant interruptions annoying and discontinue to play whereas a novice may find it interesting and stimulate continuous play. – S8	1

*Increasing Difficulty**Comments on Statement 22, Round 1**(Corresponds to Table 20)*

Likert Ranking	Comments	Survey Round
Disagree	Exercise adherence isn't necessarily about the exercise program getting harder. It's about coordinating game progression with the basic fitness principles: frequency, intensity, time and type/duration. Increasing volume should take priority over difficulty. – S7	1
Agree	Levels in games allow players to set goals and when obtained give a sense of accomplishment. Leveling in games also provides the player with an opportunity to engage in activities that are consistent with their abilities and therefore may produce a flow state. – S8	1
Agree	That will keep them engaged. if it gets too easy, they lose interest. – S6	1
Agree	Keep um hooked – S5	1
Agree	Most of the time, but it might be o.k. to have some things that are just for maintaining. A balance is necessary. – S3	1
Strongly Agree	No comment – S2	1
Strongly Agree	No comment – S4	1

*Predetermined Challenge Levels**Comments on Statement 23, Round 1**(Corresponds to Table 21)*

Likert Ranking	Comments	Survey Round
Agree	Giving some guidance to players may be a useful addition to active games but this would certainly be worthy of further investigation as it may also be a distractor for more advanced players. – S8	1
Agree	User still has choice – S6	1
Agree	we like choice – S5	1
Agree	Help them, but not require. – S3	1
Agree	No comment – S7	1
No Opinion	Not clear what you mean. Provide an example of a game "helping" players choose. – S4	1
No Opinion	Depends on the game. Sometimes too much help is considered coddling and hand-holding, which is a turnoff for many players. – S2	1