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# Integrating the Nintendo Wii into Therapy: Resources for Occupational Therapy Practitioners

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# INTEGRATING THE NINTENDO WII INTO THERAPY: RESOURCES FOR OCCUPATIONAL THERAPY PRACTITIONERS

by

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## ABSTRACT

Therapists have the challenge of identifying a variety of interesting, meaningful, and purposeful intervention activities for individuals needing rehabilitation services (Weiss, Rand, Katz, & Kizony, 2004). The purpose of this project was to develop educational resources for occupational therapists on the integration of the Nintendo Wii as an intervention.

An extensive literature review was conducted using PubMed, SCOPUS, CINAHL, professional journals, and news articles to investigate the health related effects of utilizing virtual reality and video games in the rehabilitation process. Currently, there is minimal research identifying the benefits of video games in occupational therapy practice and no protocols were found to assist occupational therapists with implementing the Nintendo Wii into occupational therapy practice.

Resources were developed to educate occupational therapy practitioners on integrating the Nintendo Wii as an occupational therapy intervention. Resources include an educational in-service, a system set-up guide, instructions for creating a Mii character, an activity analysis of the Nintendo Wii Sports games, suggested intervention chart for select performance skills, and case scenario application activities. The educational in-service provides information on the role of virtual reality in rehabilitation, benefits and precautions/contraindications of virtual reality, identification of Nintendo Wii equipment,

and system set-up instructions. The Adult Learning Theory and the Model of Human Occupation were utilized in the development of the product.

This educational in-service provides occupational therapists with information on the integration of the Nintendo Wii. It provides foundational knowledge allowing therapists to adapt and modify the use of the Nintendo Wii to facilitate occupational performance and client-centered practice. The authors of this scholarly project recommend that the Nintendo Wii be used as an adjunct to occupation-based intervention. It is also recommended that more research be conducted regarding the use of video games, specifically the Nintendo Wii, in occupational therapy to determine the efficacy of this type of approach.

# CHAPTER I

## INTRODUCTION

Virtual reality is an innovative up-and-coming technology offering a variety of new possibilities to the rehabilitation process in intervention (Schultheis & Rizzo, 2001). For patients with illness, injury, or disease, the rehabilitation process can be strenuous and extensive. Therapists are presented with the challenge to provide a variety of interesting, meaningful, and motivating interventions than can be adjusted and graded as well as have strategies for objective outcome measures (Weiss, Rand, Katz, & Kizony, 2004). Virtual reality-based therapy appears promising in the rehabilitation process (Weiss et al.).

The Nintendo Wii, a relatively new low cost and easily accessible active video game, requires active participation of the user while engaging both cognitive and motor functioning (Deutsch, Borbely, Filler, Huhn, & Guarrera-Bowlby, 2008). Although many facilities have purchased the Nintendo Wii, several therapists have expressed a lack of knowledge regarding the gaming system and requested more information regarding therapeutic implementation, rehabilitation benefits, precautions, and contraindications for clients (Personal Communication, Erin Eeg & Merri Vacura, October 7, 2008; Brenda Pauley-Colter, April 6, 2010). Currently there is little published guidance regarding how to effectively use it as an intervention strategy.

The Nintendo Wii facilitates participation in areas of occupation such as leisure and instrumental activities of daily living (IADLs) through interactive gaming while allowing physical control over the environment (Herz, 2009). The system comes with a Wii sports package that includes several sports games requiring an individual to complete physical movements, demonstrate cognitive and perceptual skills while maintaining balance and endurance (Herz). Because of these requirements, the Nintendo Wii may be beneficial as an occupational therapy intervention for individuals with physical disabilities.

The utilization of the Nintendo Wii provides advantages for occupational therapy practitioners. This gaming system allows practitioners to address performance deficits in a controlled, pleasing environment (Herz, 2009). The Nintendo Wii provides the ability to restore, adapt, and modify performance skills through the grading of activity. It also helps integrate human systems by addressing attention, problem solving, direction following, listening skills, visual-perceptual skills, balance, and physical movements at the same time (Herz).

This scholarly project incorporates key components of the Model of Human Occupation, primarily the concept of volition. Volition is the motivation for individuals to participate in occupation and is often shaped by choosing experiences to engage in, how satisfying experiences are, and engaging in meaningful and interesting experiences (Kielhofner, 2009). Volition is influenced by an individual's interests, values, and personal causation (feelings of effectiveness) which shape how they see their

environment, what they choose to do, and how they interpret their experiences (Kielhofner).

An individual's volition can be negatively affected when experiencing impairment. The integration of the Nintendo Wii is a strategy that may be used to address a client's volitional problems. Therapeutic outcomes are largely influenced by the perception of a client's ability to participate in therapeutic interventions. Virtual reality and video games increase autonomy, competence, and satisfaction as well as increase a client's perceptions of successfully participation in the therapy process (Brumels, Blasius, Cortright, Oumedian, & Solberg, 2008; Maloney et al., 2008; Rand, Katz, & Weiss, 2009; Ryan, Rigby, & Przybylski, 2006; Yalon-Chamovitz & Weiss, 2008).

This scholarly project is divided into 5 chapters. This chapter provides a brief summary of the topic and background information. The second chapter includes an extensive review of research and literature in the area of virtual reality and rehabilitation. Specific areas include concepts of virtual reality, health related changes resulting from virtual reality/video games, precautions and contraindications of virtual reality/video games, virtual reality in rehabilitation, and the motivational impact of virtual reality/video games. The third chapter outlines the procedure used in the design and development of the product. A brief description of the product itself can be found in the fourth chapter. The complete PowerPoint presentation and resources can be found in the appendices. Finally, Chapter V summarizes the scholarly project and provides recommendations for the product as well as describes the limitation of the project.

# CHAPTER II

## REVIEW OF LITERATURE

Advances in technology continue to shape our existence and impact many aspects of the human race. The health care field has substantially been influenced by technological advances providing gains in research, advanced equipment, assessment and rehabilitation services, as well as an overall increase in computer usage. Society is experiencing a large growth in technology and in the means of information exchange. Increases in the realms of information exchange trigger a demand in the health care field for computer technology that can provide an accessible information exchange in clinical rehabilitation services (Schultheis & Rizzo, 2001). As technology continues to advance, the health care field, specifically rehabilitation services, continues to explore new modalities and restorative devices to utilize in therapeutic settings.

The focus of this project is on the use of the Nintendo Wii, a relatively new active video gaming console, in occupational therapy intervention. The Nintendo Wii can be classified as an active video game as well as a type of virtual reality system that is commercially sold and has a reasonably low cost (Deutsch, Borbely, Filler, Huhn, & Guarrera-Bowlby, 2008). This literature review addresses virtual reality, video games, health related changes of virtual reality, precautions/contraindications of virtual reality, virtual reality and rehabilitation, video games as leisure activity, occupational therapy and virtual reality, and video games and motivation.

## Virtual Reality

An area of technology that has increased largely throughout the past decade involves simulated environments which are computer-generated replications of particular settings (real or fictitious) that can be experienced visually, but do not have physical properties (Ryan, Rigby, & Przybylski, 2006). Simulated environments recreate surroundings in a controlled setting. These environments are often used for educational purposes and entertainment value as well as provide an alternative environment for social interaction (Ryan et al.).

While simulated environments are reproductions of a particular setting, virtual reality is the interaction that occurs between an individual and the simulated environment. Virtual reality is a technological form of information exchange and is described as the interaction one experiences with a simulated environment through visual and auditory senses (Schultheis & Rizzo, 2001). Through the use of a variety of equipment such as computer screens, three-dimensional walls, head mounted displays, joysticks, and tracking gloves, virtual reality provides an alternate world in which a being can relate to the surroundings and become "immersed" in the fabricated environment (Schultheis & Rizzo).

Immersion, in relation to virtual reality, correlates with the sense of "presence" one feels with the virtual world (Ryan et al., 2006). These concepts describe the participation and sense of connectedness experienced while taking an active role and being a part of the virtual world (Yee, 2006). An individual may engross him/herself in a replication of reality in which he/she may choose actions without real life consequences,

as well as design appealing surroundings or meet specific needs (Schultheis & Rizzo, 2001). To provide an educational example, consider a basic driver's education course. A facilitator may utilize an interactive virtual reality system to assess the reaction of student drivers under circumstances that would not be ethical to assess in real life. In this scenario the computer-generated program that the students observe is the simulated environment, and their interaction with that environment is described as virtual reality.

## Video Games

One of the most widely recognized forms of virtual reality is the video game. Games provide physical and/or mental challenges that adhere to specific guidelines. These guidelines indicate what is allowed of a player while engaging in the game (Baranowski, Buday, Thompson, & Baranowski, 2008). "A video game is any game played on a digital device and encompasses a wide range of games played at arcades, over the Internet on personal computers, or on dedicated gaming consoles or handheld units" (Baranowski et al., p.74). Examples of popular gaming consoles include Nintendo and Playstation consoles. Advances in technology have introduced the concept of wireless based computer and/or video games to encourage greater movement and interaction with gaming consoles (Graves, Stratton, Ridgers, & Cable, 2008). Examples of these physically interactive video games include the Nintendo Wii and the Dance Dance Revolution game. A comparison of the physical effects active video games produce as opposed to sedentary video games is discussed in the following section.

Active video games can increase physical activity and overall body movement (Graves, Ridgers, & Stratton, 2008; Maloney et al., 2008) as well as decrease the amount of sedentary screen time (i.e. watching television, playing traditional inactive video games) (Maloney et al., 2008). Maloney et al. also found that children who received the active video game Dance Dance Revolution increased their participation in physical activity and reduced their participation in the amount of time spent engaging in sedentary screen activities. Dance Dance Revolution is an active video game that requires the individual to stand on a dance mat and mimic dance steps that they visualize from the screen.

Active video games may also increase activity levels as a result of the physical movements required to interact with the game. Graves, Stratton et al. (2008) found that activity levels incorporating the whole body, with emphasis on the upper extremities, were significantly higher when playing active video games as opposed to sedentary games. Increased physical activity levels as demonstrated by active video game play is correlated to the amount of energy potentially exerted as well as calories burned (Graves, Stratton et al.; Lanningham-Foster et al., 2009; Maloney et al., 2008). In addition to increasing activity levels, engaging in active video game play can result in a variety of health related changes.

## Health Related Changes

Research in the area of health related effects of video games has increased as video game play has become a widely practiced activity. Advances in technology have launched the introduction of new generation active video games. Video games and

virtual reality systems can produce a variety of health related changes such as increasing energy expenditure (Graves, Strātton et al., 2008; Lanningham-Foster et al., 2009; Maloney et al., 2008), changes in cardiovascular health (Borusiak, Bouikidis, Liersch, & Russell, 2007; Warburton et al., 2007), improving balance and increasing postural control (Brumels et al., 2008; Deutsch et al., 2008), improving upper extremity motor control (Broeren, Rydmark, & Sunnerhagen, 2004; Merians et al., 2002; Eng et al., 2007; Holden, Dyar, & Dayan-Cimadoro, 2007; Rand, Katz, & Weiss, 2009), and improving visual perceptual skills (Deutsch et al., 2008; Green & Bavelier, 2007).

**Energy Expenditure**

Engaging in active video game play has an impact on the amount of energy a person expends while engaging in the activity. Playing an active video game may increase the amount of energy exerted as opposed to the amount an individual exerts while playing a sedentary video game (Graves, Stratton et al., 2008; Lanningham-Foster et al., 2009; Maloney et al., 2008). Active video gaming consoles such as the Nintendo Wii, can cause a substantial increase in energy expenditure in children and adults resulting in an increase in movement, physical activity, and calories burned as well as decrease sedentary behaviors (Graves, Stratton et al.; Lanningham-Foster et al.; Maloney et al.).

Lanningham-Foster et al. (2009) discovered the energy expenditure of adults and children playing Wii Sports on the Nintendo Wii active gaming console more than doubled the amount expended while playing a sedentary video game. This increase in energy expenditure was most noted in the Wii Sports Boxing game. Similarly,

Graves, Stratton et al. (2008) found adolescents playing on active video game consoles expended 51% more energy than during sedentary game play. In addition to increasing energy expenditure, virtual reality and video games can have a health related impact on the cardiovascular system.

**Cardiovascular Health**

Pairing video games with exercise can also provide increases in cardiovascular health. Warburton et al. (2007) found that when college-aged males exercised on a Gamebike (a stationary biked linked to an interactive video game system), they experienced increases in aerobic capacity as well as a reduction in their resting systolic blood pressure as opposed to individuals who completed a traditional exercise program on a stationary bike.

Adversely, sedentary video games may also impact the cardiovascular system. Borusiak et al. (2007) found that participation in a racing simulation video game can cause a significant change in the cardiovascular system. Results showed that sedentary video game play "may cause disproportionate elevation in blood pressure with respect to energy consumption....a possible risk for unfavorable effects on the cardiovascular system" (Borusiak et al., p. 331).

**Balance and Postural Control**

New generation video games are advancing beyond earlier sedentary gaming systems. Active video games allow individuals to interact more efficiently with the game by integrating movements of the whole body. Because many of these active video games

allow individuals to stand while playing, new generation video games may demonstrate an effect on an individual's overall balance and posture.

Brumels et al. (2008) found that a video game based balance program using the Nintendo Wii Fit, an assortment of interactive balance games linked to a balance board, not only increased performance on balance activities, but also decreased both anterior and posterior postural sway. In addition, Deutsch et al. (2008) discovered utilizing the Nintendo Wii gaming system, specifically Wii Sports, reduced postural sway in an adolescent with cerebral palsy. While virtual reality can positively impact balance and postural control, it also allows the integration of bilateral upper extremities to potentially increase motor control.

## Upper Extremity Motor Control

Virtual reality and video games utilize a variety of hand-held equipment such as joysticks, remotes, tracking gloves, and controllers (Schultheis & Rizzo, 2001). Operation of this equipment often requires upper extremity gross and fine motor control in order to interact with the virtual environment or participate in video game play (Schultheis & Rizzo; Rand et al., 2009).

### Gross Motor

Virtual reality can be included in intervention focusing on increasing the function of an individual's upper extremities (Eng et al., 2007; Holden et al., 2007; Rand et al., 2009). Using a virtual reality system that incorporated movements such as hitting and catching, overall gross upper extremity movement improved (Eng et al.). Similarly, a

virtual reality system simulating a supermarket demonstrated an increase in overall upper extremity function allowing bilateral use of upper extremities during daily activities (Rand et al.). Improvements in overall upper extremity function as well as shoulder strength were also noted after using a telerehabiliation system (a virtual reality system involving motion tracking sensors). These improvements were also generalized and carried out in real life situations (Holden et al.).

**Fine motor**

Through the use of virtual reality systems and innovate controls, improvement can be demonstrated in bilateral hand and fine motor function such dexterity, grasp, and range of motion (Broeren et al., 2004; Merians et al., 2002; Rand et al., 2009). A virtual reality system, utilizing a glove controller to reach and select objects, demonstrated an increase in functional bilateral hand use as well as range of motion of the fingers resulting in an increased independence in the operation of the virtual reality system (Rand et al.). Another virtual reality system focused on the improvement of fine motor dexterity and grip force in an individual recovering from a stroke. Both of these areas improved significantly after the use of the virtual reality system (Broeren et al.). Similarly, an overall improvement in the range of motion of thumb and fingers was discovered after the intervention of virtual reality exercises (Merians et al.). Not only can virtual reality increase upper extremity motor control, positive changes in vision are an additional potential result.

## Vision

Virtual reality has a positive effect on various aspects of vision including visual perception and visual processing (Deutsch et al., 2008; Green & Bavelier, 2007). When specifically focusing on visual perceptual skills, Deutsch et al. found that overall visual-perceptual processing did improve. Areas of improvement included visual discrimination, visual memory, visual-spatial relationships, visual form constancy, visual figure-ground, and visual closure. Adversely, visual-spatial relationships did not increase (Deutsch et al.).

Video games can also enhance an individual's visual acuity, or ability to see objects clearly as well as their ability to discriminate singular objects from surrounding distractions (Green & Bavelier, 2007). Experienced video gamers can also demonstrate a variety of heightened visual skills. More specifically, engaging in video game play can increase visual tracking, visual memory skills and visually switching between tasks quickly (Boot, Kramer, Simons, Fabiani, & Gratton, 2008). In addition to demonstrating benefits in measurable factors such as balance, motor function, and vision; virtual reality can also provide benefits in subjective areas such as pain management.

## Pain Management

Engaging in a virtual reality experience can significantly reduce subjective reports of pain. Through the use of a virtual reality system, individuals reported a decrease in pain, anxiety, and time spent thinking about pain (Hoffman, Doctor, Patterson, Carrougher, & Furness III, 2000; Sharar et al., 2007). Through interaction with a virtual environment, an individual is distracted by pain by focusing attention on

immersion in the virtual environment (Hoffman et al., 2000; Hoffman et al., 2004; Sharar et al.). This pain management strategy has been widely utilized in adjunct to pharmacological pain relief in the rehabilitation of individuals with burn injuries (Hoffman et al., 2000; Hoffman et al. 2004; Sharar et al.).

## Precautions/Contraindications of Virtual Reality

While research provides various beneficial health-related changes that result from video game play, negative effects may also result from engaging in video game play. There are several precautions and/or contraindications that are associated with virtual reality. Research has focused on such negative associations as epilepsy (Chaudhary, Narayana, & Shah, 1999; Harding, Jeavons, & Edson, 1994; Ricci & Vigevano, 1999; Singh, Bhalla, Lehi, & Sachdev, 2001), obesity (Keeton & Kennedy, 2009; Kim & Lee, 2009; Vicente-Rodriguez et al., 2008), violence (Anderson & Bushman, 2001; Anderson et al., 2008; Gentile, Lynch, Linder, & Walsh, 2004), addiction (Gentile, 2009; Phillips, Rolls, Rouse, & Griffiths, 1995; Tejeiro Salguero & Bersabe Moran, 2002), and injury (Bonis, 2007; Hirpara & Abouazza, 2007; Nett, Collins, & Sperling, 2008). These will be explored in further detail.

### Epilepsy

Video games have not been proven as a direct cause of inducing seizures (Ricci & Vigevano, 1999). Due to the brightness of video screens, flashing graphics, and high contrast stimuli resulting from television screens, video games have been associated as a potential risk factor for seizures (Ricci & Vigevano). Individuals with a history of

epilepsy or who have experienced a previous seizure pose a higher risk of experiencing a seizure as a result of video game play (Harding et al., 1994; Ricci & Vigevano).

A reflex seizure, the most common form of epilepsy, results from video game play in individuals who demonstrate high sensitivity to light (Singh et al., 2001). Five percent of epileptics demonstrate epileptic features as a result of bold visual stimuli and flashing lights (Chaudhary et al., 1999). Individuals who demonstrate this type of seizure can easily be treated by removing the triggering stimulus in combination with medications (Singh et al.). Due to the sedentary nature of most video and/or computer games, obesity is another risk factor associated with virtual reality and video games.

**Obesity**

According to the World Health Organization (2006), globally 400 million adults were obese in 2005. This statistic is projected to rise to 700 million by 2015. Major causes of the obese population include poor nutritional diet, decreased physical activity, and increased sedentary habits (World Health Organization). While various sedentary habits exist, watching television demonstrated the highest correlation with the risk for adult obesity, in fact Hu, Li, Colditz, Willett, and Manson (2003) discovered that for every two hour increase in time spent watching television a day, the risk for obesity increased 23%.

According to the Center for Disease Control and Prevention (2009), children and adolescent obesity has increased substantially in the past 25 years. Between 2003 and 2006, almost 33% of children between the ages of two and nineteen were considered overweight in the United States alone (Ogden, Carroll, & Flegal, 2008). Childhood

obesity remains a societal concern especially in regards to children with disabilities, minorities, and co-morbidities such as diabetes, metabolism concerns, and/or poor cardiovascular health (Keeton & Kennedy, 2009; Kim & Lee, 2009). In fact, adolescents who engaged in sedentary video game play and watched television experienced a higher body fat percentage and obesity risk (Vicente-Rodriguez et al., 2008). Not only are there concerns about the sedentary lifestyle that surrounds video game play, there are many concerns about the content of video games and the violence associated with certain games.

**Violence**

There have been many concerns about the content of video games and the violence associated with certain games. Exposure to violent video games is correlated with high levels of aggression in children and adolescents and may increase feelings of hostility (Anderson & Bushman, 2001; Gentile et al., 2004). These levels significantly correlate with the amount of violence present in video games as well as the amount of violence adolescents' desire in their video games (Gentile et al.).

When exploring the effects of violent video games, it was found that adolescents who regularly participated in violent video games demonstrated increased aggressiveness. This demonstration of aggressiveness also occurred later in life (Anderson et al., 2008). Video games may be classified as violent if they include "blood and gore…those that depict characters intentionally harming other characters who presumably wish to avoid being harmed" (Anderson et al., p. e1068). In addition to violence, there have been concerns about the addicting behaviors that may surround video game play.

## Addiction

Addiction damages levels of functioning in numerous areas. Psychological function, social interaction, school, vocation, and family dynamics all may be affected by addiction (Gentile, 2009). Video games that are interactive, challenge gamers with a variety of complex skills, and employ realistic graphics are more likely to lead to addictive behaviors (Phillips et al., 1995). One of the largest concerns for adolescents to develop a dependence on video game play is associated with the concept of pathological gaming (Gentile; Tejeiro Salguero & Bersabe Moran, 2002).

Pathological gamers can be described as gamers that play more frequently and for longer periods of time (Gentile, 2009; Tejeiro Salguero & Bersabe Moran, 2002). Gentile found that 8.5% of a sample of children and adolescents were considered pathological gamers. Pathological gamers were more likely to report health problems, focusing problems, and feeling "addicted" to video games (Gentile). Similarly Tejeiro Salguero and Bersabe Moran discovered that pathological gamers identified dependence on video games as an escape from reality, feeling out of control, invasive, and potentially harmful to social maturity.

## Injury

The introduction of a more active gaming system has subsequently broadened the realm of injuries that may result from video game use. The Nintendo Wii utilizes a hand held controller that "allows the player to control the video game by sensing the player's spatial movements in three dimensions" (Nett et al., 2008, p. 481). In addition the controller is light weight and when paired with aggressive movements it increases the

risk of injuries, muscle overuse, and muscle soreness (Nett et al.). Active video games like the Nintendo Wii do not require users to be physically fit or to complete physical training prior to playing the games. Additionally the amount of endurance utilized while playing the game is not as limiting as engaging in the real sport resulting in individual devoting longer periods of consecutive time, and increasing the risk of injury (Bonis, 2007; Hirpara & Abouazza, 2007; Nett et al.).

"Nintendinitis" is a common injury experienced with playing video games (Nett et al., 2008). The first documented case resulted from a woman who played her newly purchased Nintendo gaming system for five consecutive hours and experienced severe pain in the right extensor tendon of her thumb (Brasington, 1990). Since the introduction of the active gaming system, the Nintendo Wii, various cases of injuries involving acute swelling and pain determined as "Wiiitis" have been documented (Bonis, 2007; Nett et al.).

## Virtual Reality and Rehabilitation

Rehabilitation increases function, allowing individuals to become more independent and engage in daily activities in natural environments (Weiss, Rand, Katz & Kizony, 2004). Rehabilitation can be difficult and demanding for the client, challenging health care professionals to find motivating, appealing, and meaningful tasks for the rehabilitation process (Weiss et al.). Virtual reality can provide new strategies for interventions as well as effective outcome measures (Schultheis & Rizzo, 2001; Weiss et al.). Virtual reality has the potential to provide more objective measures in relation to assessments; as often in rehabilitation settings assessment protocols may be more

subjective (Schultheis & Rizzo). The advanced technology offered by virtual reality may increase consistency and reduce variance experienced with subjective assessments (Schultheis & Rizzo).

Virtual reality can provide "naturalistic" environments where individuals feel a sense of presence. A sense of presence allows individuals to focus strictly on the task allowing motor and cognitive skills to be trained or restored (Weiss et al., 2004). In addition to mimicking natural environments, virtual reality can allow the creation of safety scenarios that would be potentially dangerous and unethical to assess with individuals in real life (Schultheis & Rizzo, 2001; Yalon-Chamovitz & Weiss, 2008).

Virtual reality provides more opportunity to adapt conditions to mimic real life scenarios as well as allow therapists and other specialists to alter the environment to best fit the needs of the individual and to create challenges for the individual during treatment sessions (Schultheis & Rizzo, 2001; Weiss et al., 2004; Yalon-Chamovitz & Weiss, 2008). This concept not only allows the therapist to individualize treatment, which is beneficial when striving for client-centered practice, but also to make measured adjustments in complexity levels to assure the appropriate degree of challenge when striving towards goals (Schultheis & Rizzo).

## Virtual Reality as a Leisure Activity

With advancing technology, and the introduction of the internet, outlets for leisure participation have expanded beyond simple activities to include television, photography, internet, gaming consoles, as well as quicker and more efficient means of travel (Bryce, 2001). The internet alone opens up the virtual world as a context for leisure engagement

and provides an additional environment to interact with others and engage in leisure activities (Bryce).

Virtual reality has been used as a leisure alternative for individuals with physical and intellectual disabilities (Yalon-Chamovitz & Weiss, 2008). Virtual gaming environments can be engaging and stimulating, as well as adaptable to the function levels of individuals with various limitations. By adjusting the virtual environment, individuals with physical and intellectual disabilities can engage in leisure activities they would otherwise have difficulties engaging in. Examples of such leisure activities include sports, car racing, juggling, snowboarding, and parachuting.

Gaming is another aspect of virtual reality that may influence the rehabilitation process. Gaming is the participation in video game play for recreation (Ryan et al., 2006). Virtual reality is widely associated with "gaming" and may increase motivation in rehabilitation participation as well as introduce strategic thinking and visual tactics while completing interventions (Schultheis & Rizzo, 2001). Considered as one of the fastest growing recreational activities, video game play attracts a wide variety of demographic groups (Ryan et al.). Because the gaming world is so pleasant to many different people, players are generally motivated to engage in game play.

## Occupational Therapy and Virtual Reality

The video game industry has been revolutionized with the introduction of the Nintendo Wii system in 2006. Due to the possibility of the Nintendo Wii being utilized by a variety of populations, occupational therapy has begun to include it as an intervention in the rehabilitation setting as well. It has been publicized as a new gaming

experience appealing to a variety of populations from young to elderly (Herz, 2009; Snider, 2008; Drummond, 2008).

The Wii particularly appeals to occupational therapy practitioners because it permits clients to participate in activities using physical and cognitive abilities that are similar to reality (Snider, 2008; Herz, 2009). It encourages the integration of human systems by addressing several components (psychosocial, sensorimotor, cognitive/perceptual, and physical) while completing an activity (Herz). In an interview, Laurel Cargill Radley of the American Occupational Therapy Association states "Physical rehab clinics have used computer and video games for many years, but the Wii uses much more complex and much broader use of the movement…It's like a simulation machine" (Snider, para. 35).

The client can become part of an activity that he/she would like to do or needs to do while having control over a virtual environment. Also, as the client improves while playing a specific game, the level becomes more difficult. Therefore, the activity can be graded specifically to the client and provides the appropriate level of challenge (Herz, 2009). The client must use specific movements to participate in a game that are equivalent to participating in the actual sport (i.e. simulation of a tennis serve or simulation of throwing a bowling ball) in order to progress in the game (Drummond, 2008).

## Video Games and Motivation

With advancing technology, many every day activities that individuals engage in, including leisure activities, continue to advance. Video games are a recreational activity

in which individuals are motivated to engage in due to feelings of "presence" in a virtual environment (Ryan et al., 2006, Yee, 2006). Video game play increases motivation through autonomy and competence resulting in a significant effect on enjoyment as well as intentions of future game play (Ryan et al.). In addition, the motivational factor of relatedness contributes to the motivations of individuals engaging in online gaming communities as a result of the environment of the online community encouraging interaction with other players (Ryan et al.). Three central factors affecting gamers' motivation to play include the social component (establishing relationships), the immersion component (interacting completely with the game and the fantasy world), and the achievement component (competing to triumph over challenges and defeat opponents) (Yee). Although these components vary between individuals, they provide a foundation of driving factors in gamers' motivation to engage in video game play (Yee).

**Client Satisfaction**

Participating in virtual reality rehabilitation or video game play provides individuals with a sense of presence within the virtual environment often leading to feelings of satisfaction (Weiss et al., 2004). Virtual reality systems and video games can increase satisfaction by allowing individuals to feel a sense of control and enjoyment while working towards a goal (Rand et al., 2009; Crosbie, Lennon, McNeill, & McDonough, 2006; Brumels et al., 2008). With higher levels of satisfaction and enjoyment, individuals perceive virtual reality and/or video games to provide more achievable outcomes, and perceive the interventions as less difficult (Brumels et al.; Maloney et al., 2008; Rand et al.; Yalon-Chamovitz & Weiss, 2008).

## Client Participation

Not only do high levels of enjoyment motivate engagement in video game play, but higher attendance rates also suggest video games are an incentive to participate in therapeutic intervention. Higher attendance rates were discovered in groups that utilized virtual reality and/or video game interventions (Chin A Paw, Jacobs, Vaessen, Titze, & van Mechelen, 2008; Warburton et al., 2007).

## Summary

Virtual reality provides an innovative approach to the rehabilitation process. This literature review discussed the health related changes and precautions associated with virtual reality as well as the role of virtual reality in rehabilitation. Research involving the effects that video games have on users as well as the utilization of video games as a therapeutic intervention is extremely limited.

The Nintendo Wii is a low cost and commercially available gaming console that provides many different games to keep clients engaged while addressing performance areas such as motor control, coordination, range of motion, balance and visual perception. It also provides a virtual environment that can be brought to the session allowing the patient to engage in a simulated environment to improve his/her overall function and well-being.

Due to recent technological advances and the introduction of active video games, therapists may not be aware of the possible health related benefits, increased motivation and enjoyment in therapeutic sessions that the Nintendo Wii may provide. This project

includes educational resources for therapists in order to introduce the Nintendo Wii as a possible therapeutic intervention. The following chapter describes the procedures used to develop the resources based on current research regarding the use of technology in rehabilitation interventions.

# CHAPTER III

# METHODOLOGY

Through extensive review of literature, it was determined there is little research regarding video games used as interventions in occupational therapy. Due to the introduction of active video gaming consoles such as the Nintendo Wii, occupational therapists have the opportunity to integrate these gaming consoles into the therapy process. While reviewing the literature, it was determined there is a need for resources for occupational therapists on integrating the Nintendo Wii into occupational therapy practice.

An extensive literature review was conducted using PubMed, SCOPUS, CINAHL, professional journals, clinically based textbooks, and news articles to investigate the health related effects of utilizing virtual reality and video games. Key terms utilized in the search engine included virtual reality, video games, rehabilitation, therapy, health, games, and computer games. Information obtained was categorized into four main concepts that helped in the creation of the product. These areas include virtual reality's role in rehabilitation, health related changes, precautions and/or contraindications, and the impact of virtual reality on motivation.

The first area discussed the role of virtual reality in the rehabilitation process. Information regarding the advantages virtual reality may have in the rehabilitation process was used to validate the product. The second area discussed the health related

changes caused by video game play. Beneficial health outcomes were utilized in the development of the product. The third area identified the precautions and contraindications of virtual reality and video games. The fourth and final area involved the impact of virtual reality and video games on the motivation of participants.

In addition to information from the literature review, the Nintendo Wii Operations Manual and the official Nintendo Wii website were explored in order to achieve the greatest amount of knowledge about the gaming console for the development of the product. Familiarity with the system was increased through system set up and actually playing Nintendo Wii sports games in order to understand the movements and processing required to engage in video game play. This knowledge and hands on experience helped in the design and creation of the product.

Because this in-service was created for the adult occupational therapy practitioner population, key concepts of the adult learning theory were incorporated in the design of the product in order to maximize the educational experience of the in-service. Adult learners are primarily motivated through problem centered learning that allows the learners to apply their knowledge and skills to solve problems (Bastable, 2006). In order to facilitate problem centered learning, case study activities were developed to allow practitioners to utilize clinical experience and knowledge through immediate application to case scenarios.

In addition, adult learners are motivated through the active participation in the learning process (Bastable, 2006). Key learning objectives are provided to the adult

learners at the beginning of the session. Demonstration and hands on experience are incorporated to allow adult learners to actively engage in the learning experience.

A complete PowerPoint presentation was created to provide a visual aid in the instruction of the material. The PowerPoint presentation includes notes pages which provide information on each slide allowing any individual to present the material. It is recommended that the individual presenting the information be familiar with the system and how to use it. Informational handouts, charts, and activities were developed to use throughout the presentation to maximize the learning experience. It is recommended that demonstration also be used in order to help familiarize the audience with the gaming equipment and to gain experience with the gaming process. By incorporating teaching strategies such as demonstration and utilizing learning handouts, the adult learning experience is maximized to ensure greater knowledge retention (Bastable, 2006).

The educational in-service was created for occupational therapy practitioners and is written at an appropriate reading level for this audience. The in-service highlights information found in the literature as well as provides instruction on how to use the gaming console. A more detailed description of the product is provided in the following chapter.

# CHAPTER IV

# THE PRODUCT

The Nintendo Wii is a virtual reality and a video game system that has the potential to be incorporated into occupational therapy intervention. It can be utilized in order to provide therapeutic activities in a challenging yet safe environment. This system allows the occupational therapist to bring the activity to the client instead of bringing the client to the activity which can be unsafe and unethical (Schultheis & Rizzo, 2001; Yalon-Chamovitz & Weiss, 2008).

The focus of this product is on the use of the Nintendo Wii, a relatively new active video gaming console, in occupational therapy intervention. The Nintendo Wii is commercially sold and has a reasonably low cost (Deutsch, Borbely, Filler, Huhn, & Guarrera-Bowlby, 2008). This chapter addresses the purpose for this product, a description of the product, the frame of reference that guided this product, and an in-depth look at the actual product.

## Purpose

Client centered practice has become an increasingly important subject in regards to health care professionals (Institute of Medicine, 2003). Client centered practice includes having effective communication skills in which a healthcare professional not

only listens to the client, but provides information and education to the client. The decision making process is collaborative between the occupational therapist and the client (Moyers, 2003). Occupational therapy intervention for clients with a physical disability includes providing treatment that can be tailored to a client's needs and personal goals.

Based on the literature review little research in the use of virtual reality systems in occupational therapy was found, however it is an area of concern and it is recommended that further research in this area be conducted. Health care professionals are challenged to find motivating, appealing, and meaningful tasks due to the fact that rehabilitation can be difficult and demanding for the client (Weiss, Rand, Katz, & Kizony, 2004). Virtual reality systems are not usually commercially available and can be relatively expensive (Deutsch et al., 2008). Recently the Nintendo Wii has been introduced to the public. The Nintendo Wii is a revolutionary active video game that is relatively low-cost and commercially accessible. The Nintendo Wii can also be classified as a virtual reality system because a virtual environment is brought to an individual. Since this is a relatively new piece of equipment, occupational therapists may be unaware of the number of health related benefits, increased motivation and enjoyment in therapeutic sessions that the Nintendo Wii may provide. The purpose of this product is to provide educational resources allowing therapists to use the Nintendo Wii as a meaningful occupational therapy intervention for patients with a variety of physical disabilities.

## Description

Through the review of current literature, research was obtained in areas including the role of virtual reality in rehabilitation, benefits and precautions/contraindications of virtual reality, and virtual reality's impact on motivation. This research was utilized in the development of educational resources for occupational therapists on integrating the Nintendo Wii into therapy. These resources include an educational in-service, a system set-up guide, instructions for creating a Mii character, an activity analysis of the Nintendo Wii Sports games, suggested intervention chart for select performance skills, and case scenario application activities. In addition to research, knowledge of the gaming system obtained through experience and exploration of the Nintendo Wii Operations Manual was utilized in order to identify equipment, provide system set-up instructions, and complete an activity analysis of the Nintendo Wii Sports games.

The educational in-service is designed to be provided by occupational therapists who are familiar with the Nintendo Wii system and have experience in treating clients with a wide variety of physical disabilities. Based on a comprehensive literature review, the in-service and instructional guide focus on health related changes and precautions/contraindications of using the Nintendo Wii system for clients with physical disabilities. Occupational therapists need to be aware of these health related changes and precautions/contraindications as well as how to use the Nintendo Wii as a therapeutic intervention that is client-centered (Broeren, Rydmark, & Sunnerhagen, 2004; Brumels, Blasius, Cortright, Oumedian, & Solberg, 2008; Deutsch et al., 2008; Eng et al., 2007; Graves, Stratton, Ridgers, & Cable, 2008; Green & Bavelier, 2007; Holden, Dyar, &

Dayan-Cimadoro, 2007; Lanningham-Foster et al., 2009; Maloney et al., 2008; Merians et al., 2002; Rand, Katz & Weiss, 2009).

**Frame of Reference**

The Model of Human Occupation (MOHO) was used to guide the development of this product. The purpose of this model is to promote engagement in occupation. There are issues that arise that can affect engagement in occupation when an individual has an illness or disability. It addresses an individual's motivation to participate in an occupation, the specific routines and patterns that an individual engages in, the skills of an individual and the impact of these skills on performance, as well as the influence of the environment on participation in occupation (Kramer, Hinojosa, & Royeen, 2003).

When implementing the Nintendo Wii into therapeutic intervention, it is necessary to promote engagement in the session and to be aware of the effects of an individual's illness or disability. Furthermore it is important to ensure that a client has the volition to participate in the session in order to allow a choice and an actual desire for the activity. The habituation component is important in that prior habits and routines are often affected by the onset of an illness or disability, and the individual may have to adapt or initiate new habits and routines. Many individuals will require a change in the leisure activities they previously enjoyed. The skills of an individual are important because if he/she has a deficit in motor, process, or communication skills then the performance in the activity will be affected. Use of the Nintendo Wii in therapy offers a way to engage a variety of skills and abilities of a client. Also, the environment is important as it can offer both opportunities and constraints. In a therapeutic setting it can

be impossible at times, as well as unsafe, to bring a client to a specific environment. With the Nintendo Wii, the environment can be brought to the client instead (Kramer et al., 2003).

In addition to MOHO, principles from the adult learning theory were used in developing the resources. Learning is a complex notion and it depends on many factors that influence a learner to adapt or learn a new behavior. It is important to identify and prioritize the needs of a learner, and to determine what ideas he/she decides is important to learn about. Every individual learns differently and this style of diversity must be considered in order to provide effective and efficient education (Bastable, 2006).

Adult learning principles are incorporated into the resources developed for occupational therapists implementing the Nintendo Wii as an intervention. First, learning is related to an immediate need or an immediate problem. In addition, learning is problem-centered and the information presented is important to the specific intervention. The new material presented will actually draw on past experiences of the occupational therapists who have treated clients with physical disabilities. The learners will have the ability to learn in a group setting in which all of the participants are occupational therapists. Lastly, the learners will actively participate and this learning will be reinforced by application of the material (Bastable, 2006).

The instructional materials provided to the learners use a variety of strategies in order to adapt to different learning styles. The resources will be presented as an in-service with a variety of learning activities, handouts, and case studies embedded in the

in-service. The handouts are intended for the learners to use as a reference after the in-service (Bastable, 2006).

**Product**

The product consists of an educational in-service with handouts for an instructional guide, a system set-up guide, instructions for creating a Mii character, an activity analysis of the Nintendo Wii Sports games, suggested intervention chart for select performance skills, and case scenario application activities. These resources have been developed in order to provide occupational therapists with the basic knowledge needed to utilize the Nintendo Wii as a therapeutic activity for a variety of patients with physical disabilities. Four key objectives guided the development of this product. Primarily, the in-service and activity analysis provides occupational therapists the foundational knowledge about virtual reality, video games, as well as specific knowledge pertaining to the Nintendo Wii. Next, the equipment associated with the Nintendo Wii is demonstrated, with the emphasis on therapists being able to set up the system for usage. The benefits as well as the precautions and/or contraindications associated with virtual reality use are described. Lastly, occupational therapists are encouraged to use clinical reasoning in identifying ways to integrate the Nintendo Wii into intervention and adapt/modify it to fit the needs of various populations.

The information for the educational session is provided via PowerPoint presentation along with handouts for the attending participants. The PowerPoint presentation includes specific notes pages providing detailed information to guide the presentation. The handouts are intended to be used as an instructional guide for the

attending participants to use in order to implement the Nintendo Wii system in therapy sessions.

At the end of the in-service, attending practitioners will be surveyed through two post-service evaluations. The first is an immediate post-service evaluation to determine the effectiveness of the in-service and resources. The second is a two month follow-up evaluation in order to determine if the attendees have utilized the Nintendo Wii in intervention since the in-service and if it was found to be beneficial to clients.

A system set-up guide and instructions for creating a Mii character were developed to aid occupational therapists in the first time use of the Nintendo Wii. Specifically, it is intended provide a quick reference to set-up the Nintendo Wii as well as information and pictures for creating a Mii. The Mii is a digital avatar or character on the Nintendo Wii that the client can personalize to look like him/herself.

An activity analysis was completed on all five of the Nintendo Wii Sports games to provide information on what skills are needed for an individual to participate in Wii sports game play. Suggestions are provided to guide the therapist in how to adapt the Nintendo Wii to fit various disabilities. Two case studies with sample goals were developed to allow the participating occupational therapists to apply the knowledge learned and utilize problem solving skills to integrate Nintendo Wii in occupational therapy intervention. It is necessary for each participant to utilize their own creativity and critical thinking skills to adapt the Nintendo Wii to fit the needs of each specific client.

## Conclusion

The Nintendo Wii can be classified as an active video game as well as a type of virtual reality system that is commercially sold and has a reasonably low cost. Utilizing the Nintendo Wii in therapy sessions provides a unique intervention that can be adapted to a specific client. It is important to educate occupational therapists on this revolutionary treatment option in order for it to be effectively utilized.

This in-service and instructional guide has been developed in order to help occupational therapists to become familiar with the Nintendo Wii system. It provides information on benefits and precautions/contraindications of virtual reality and video games as well as strategies to implement the Nintendo Wii as a therapeutic intervention with clients experiencing a wide variety of physical disabilities. The focus is on assisting occupational therapists to utilize client-centered interventions based on the client's overall abilities.

This chapter provided a summary of the resources designed for occupational therapists. These resources can be found in the appendices. Chapter V provides a summary of the process and recommendations for implementation and future research.

# CHAPTER V

## SUMMARY AND RECOMMENDATIONS

The educational in-service and resources were developed in order to inform occupational therapists of the Nintendo Wii system. This is a creative, innovative intervention technique that can be utilized with clients with a variety of physical disabilities. The Nintendo Wii is an active video game as well as a virtual reality system so it is pertinent to educate occupational therapists on video games, virtual reality, and specifics on the Nintendo Wii. In the implementation of the Nintendo Wii as a therapeutic intervention, clients can experience a meaningful and motivating activity through participation in a virtual environment. Each activity can be tailored to a client's needs and the game will provide additional challenges as the skills of the client progress.

The in-service handouts are provided as an instructional guide for the occupational therapists to utilize in their own intervention sessions. This ensures that the participating occupational therapists will have the resources of the Nintendo Wii as well as the specific information to set-up the system. The in-service provides background information regarding the role of virtual reality in rehabilitation, health related benefits of virtual reality, common precautions/contraindications associated with virtual reality, and the effect of virtual reality on motivation. Following this information a detailed description of the equipment and system set-up is presented with a demonstration. The recommended therapeutic process is described including the use of the Model of Human

Occupation as the theoretical approach, activity analysis of performance components required to participate in each Sports game, and suggested modifications of Nintendo Wii interventions based on specific functional deficits. Case scenarios were developed to allow application of knowledge and allotted time for practitioners to trial the Sports games on the Nintendo Wii.

Following the in-service, participating occupational therapists are asked to complete two surveys. The first is the immediate post-service evaluation to determine the effectiveness of the in-service and resources. The second is a two month follow-up evaluation in order to determine if the practitioners actually utilized the Nintendo Wii in therapy sessions and if it was found to be a beneficial intervention with clients.

Future recommendations for this project include updating the in-service and instructional guide to reflect future research. These effects can be positive or negative and occupational therapists utilizing the Nintendo Wii in intervention must be aware of these effects. Special consideration should be paid to the active video games such as the Nintendo Wii. Currently there is minimal research in actual use of the Nintendo Wii as an occupational therapy intervention.

Practitioners need to be attentive to research regarding outcome measures and assessments. Virtual reality can possibly provide effective outcome measures for interventions (Schultheis & Rizzo, 2001; Weiss, Rand, Katz, & Kizony, 2004). Virtual reality has the potential to provide more objective measures in challenging yet safe environments (Weiss et al.). Assessment protocols in rehabilitation settings may be more subjective; however the advanced technology offered by virtual reality may increase

consistency and reduce variance experienced with subjective assessments (Schultheis & Rizzo). In addition to imitating natural environments, virtual reality can allow the creation of safety scenarios that would be potentially dangerous and unethical to assess with individuals in real life (Schultheis & Rizzo, Yalon-Chamovitz & Weiss, 2008). Virtual reality can be utilized to assess a wide variety of cognitive areas such as attention, sequencing, visual perceptual skills, memory, and executive functioning (Weiss et al.). It is important for practitioners to use their best judgment when utilizing the Nintendo Wii as an assessment or outcomes measure with clients.

New games are routinely being developed and marketed. Occupational therapists need to complete an activity analysis and use clinical reasoning to determine the suitability of these games before integrating them as therapeutic interventions. Additional research is needed to document the effectiveness of virtual reality and specifically the Nintendo Wii system. Research is needed in both assessments of function and outcome measurements of interventions.

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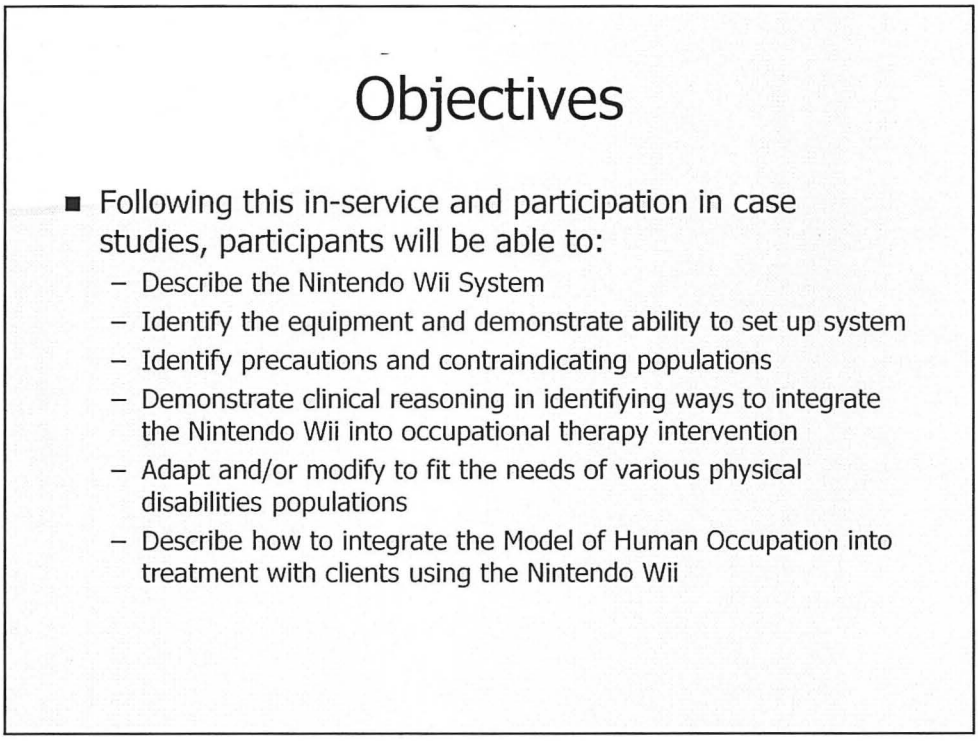
# APPENDICES

# Appendix A:

# Educational In-Service

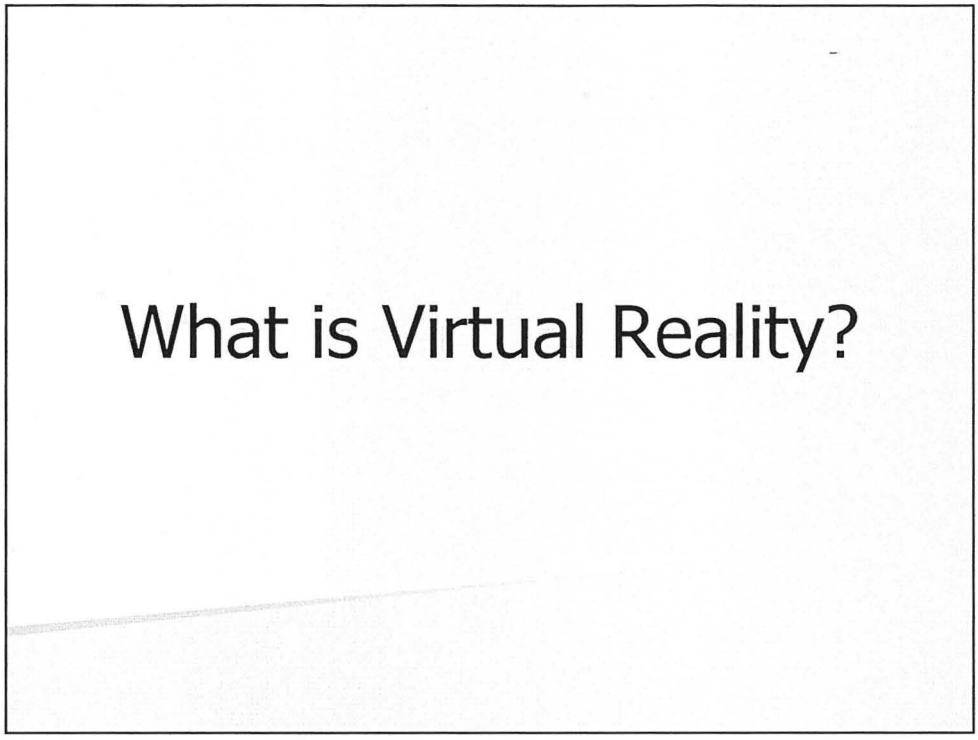
# Integrating the Nintendo Wii into Therapy: Resources for Occupational Therapy Practitioners

By Ashley Bowersox and Sarah Lund




•This educational in-service will provide you with foundational knowledge about virtual reality as well as the benefits and precautions and/or contraindications associated with virtual reality use. In addition to this information, this presentation will give you a closer look at what the Nintendo Wii is, the equipment utilized, and how to set up the system.

•An activity analysis was completed on all five of the Nintendo Wii Sports games to provide information on what skills are needed for a health individual to participate in Wii sports game play. Suggestions of how to adapt the Nintendo Wii to fit various disabilities will be provided, but it is encouraged to utilize your creativity and critical thinking skills to adapt the Nintendo Wii to fit your clients needs. At the end of the presentation, we will address a couple of case studies allowing you to apply the knowledge you have learned and utilize your problem solving skills to integrate Nintendo Wii as in occupational therapy intervention.




•Before we begin discussing what virtual reality is, does anyone have any experience with virtual reality?

•Has anyone every used virtual reality in rehabilitation before?

## What is Virtual Reality?

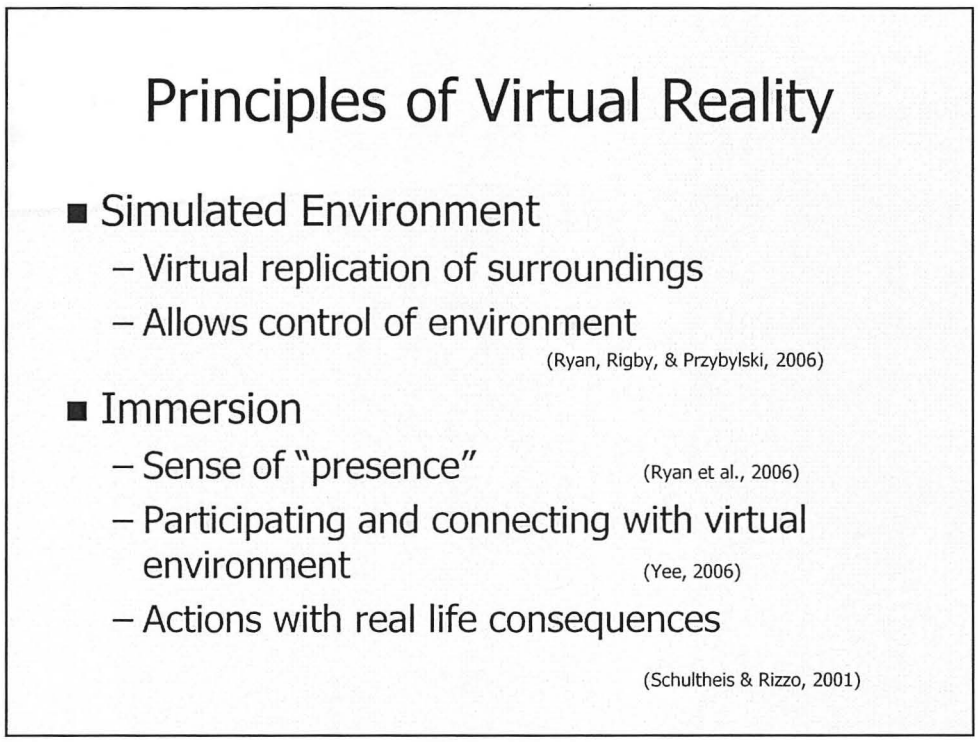
- A technological form of information exchange
- Interaction between an individual and a simulated environment
- Computer screens, joysticks, tracking gloves, head mounted displays, remotes, three-dimensional walls, etc.
- Simulated environments and immersion

(Schultheis & Rizzo, 2001)

•Virtual reality is a technological form of information exchange and is described as the interaction one experiences with a simulated environment. This interaction can involve both visual and auditory senses (Schultheis & Rizzo, 2001).

•Virtual reality utilizes a wide variety of equipment such as computer screens, three-dimensional walls, remotes, head mounted displays, joysticks, and tracking gloves (Schultheis & Rizzo, 2001).

•Two of the main concepts surrounding virtual reality include simulated environments and the concept of immersion (Schultheis & Rizzo, 2001).



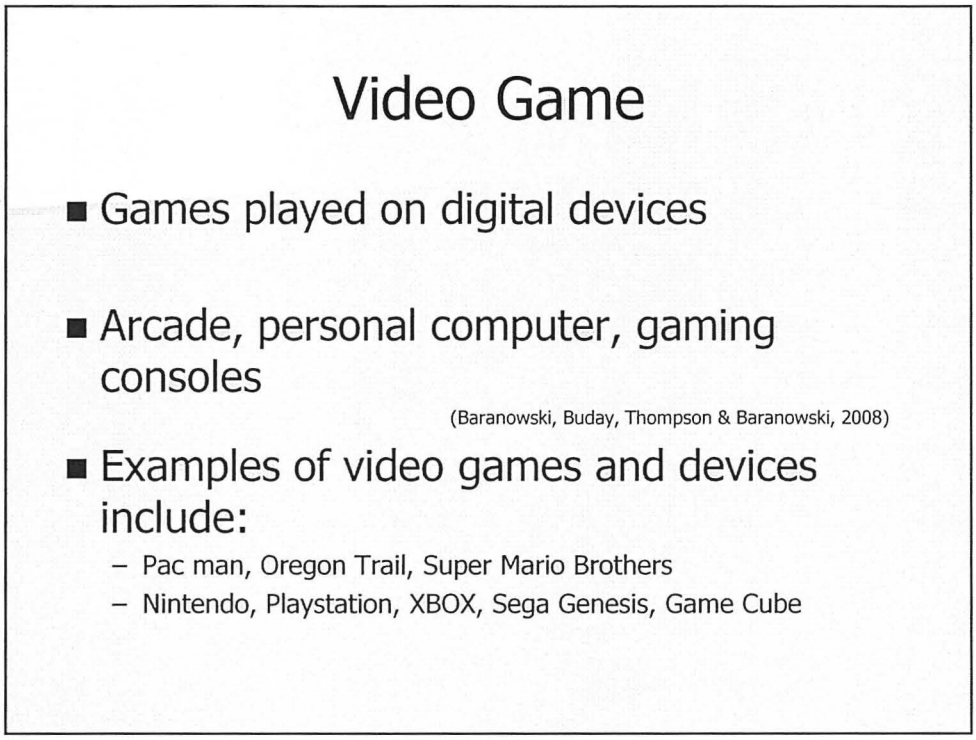

•The first concept of virtual reality involves simulated environments. Simulated environments are computer-generated replications of selected surroundings in a controlled setting that are experienced visually but do not have physical properties. These environments are often used for educational purposes as well as for entertainment value. Simulated environments may also provide an alternative environment for social interaction for individuals who demonstrate discomfort with the concept of social interaction. (Ryan, Rigby, & Przybylski, 2006).

•To provide an examples of simulated environments and virtual reality, consider a basic driver's education course. A facilitator may utilize an interactive virtual reality system to assess the reaction of student drivers under circumstances that would not be ethical to assess in real life. In this scenario the computer-generated program that the students observe is the simulated environment, and their interaction with that environment is described as virtual reality.

•The second principle of virtual reality involves the concept of immersion.

•Virtual reality provides an alternate world in which a being can relate to the surroundings and becoming "immersed" in the fabricated environment (Schultheis & Rizzo, 2001). Immersion correlates with the sense of "presence" one feels with the virtual world (Ryan et al., 2006). These concepts describe the participation and sense of connectedness experienced while taking an active role and being a part of the virtual world (Yee, 2006). An individual may engross him/herself in a replication of reality in which he/she may choose actions without real life consequences, as well as design appealing surroundings or meet specific needs (Schultheis & Rizzo).

•Consider the previous example of students taking a basic drivers education course. Immersion can be described as the students level of perceived involvement in the scenario, or how realistic they feel their actions are in that simulated scenario.



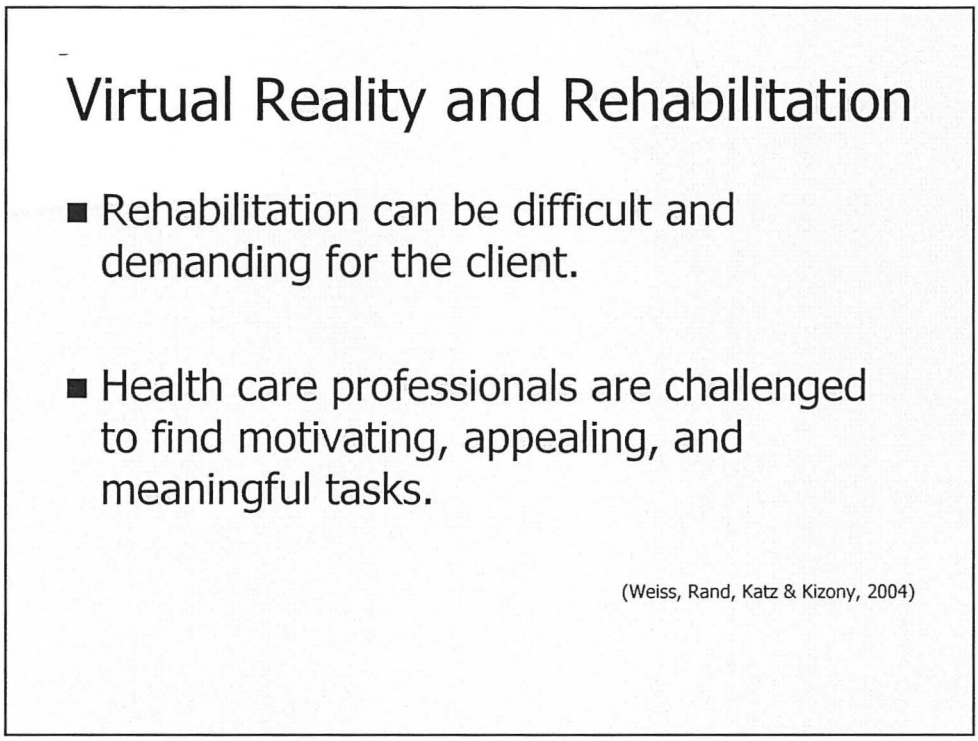

•A popular form of virtual reality that is widely recognized and utilized is the Video game.

QUESTION:

"Does anyone have experience with video games"

"What are your perceptions of video games"

A video game is any game played on a digital device and encompasses a wide range of games played at arcades, over the Internet on personal computers, or on dedicated gaming consoles or handheld units" (Baranowski, Buday, Thompson & Baranowski, 2008).

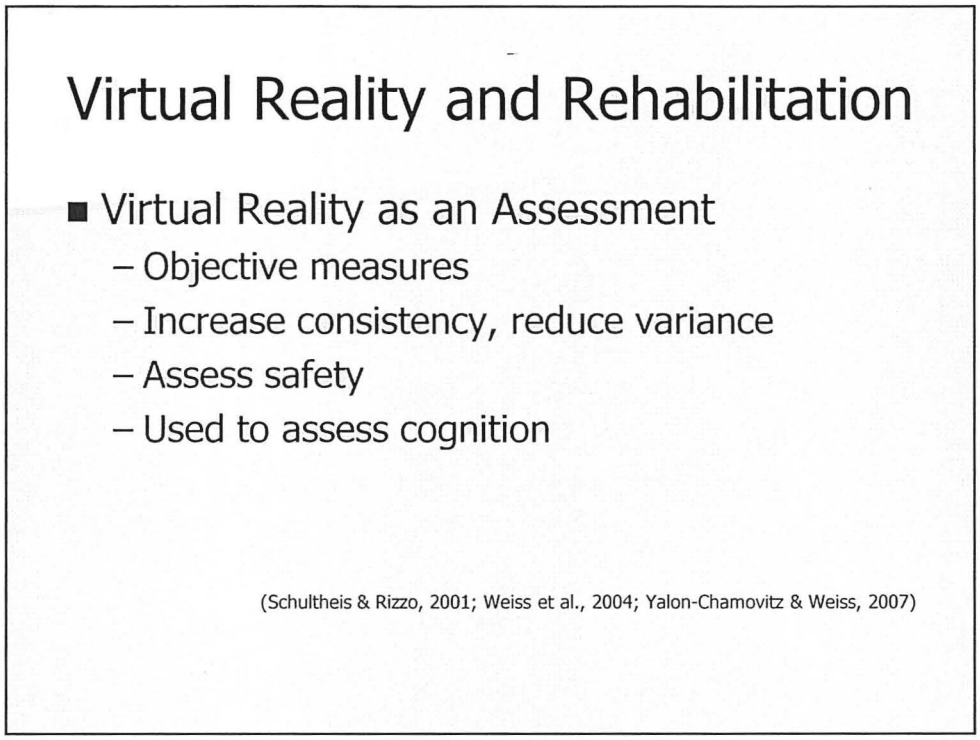



•Rehabilitation increases function allowing individuals to become more independent and engage in daily activities in natural environments. (Weiss, Rand, Katz & Kizony, 2004). Rehabilitation can be difficult and demanding for the client, challenging health care professionals to find motivating, appealing, and meaningful tasks for the rehabilitation process (Weiss et al.).

QUESTION:

Think about your own personal experiences with clients and establishing intervention plans. Can you think of one client in particular that you had difficulty motivating, that did not want to participate in therapy, or that thought the interventions you were doing were meaningless or boring? What strategies did you use to engage this client in the therapeutic process? Feel free to share your experiences.

Now think back to clients you have worked with in the past, how do you think they would respond to virtual reality in their rehabilitation process? What factors might your client find engaging? What factors may act as barriers to the rehabilitation process with particular clients?

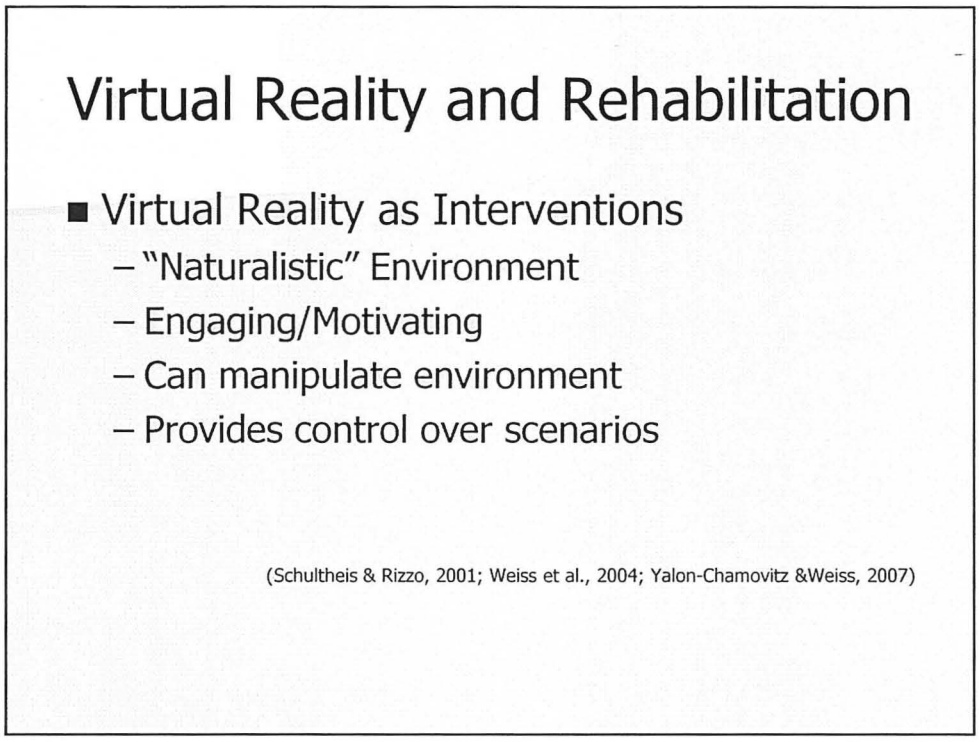



•Virtual reality can provide new strategies for interventions as well as effective outcome measures (Schultheis & Rizzo, 2001; Weiss et al, 2004). Virtual reality has the potential to provide more objective measures in challenging yet safe environments (Weiss et al.). Often assessment protocols in rehabilitation settings may be more subjective (Schultheis & Rizzo). The advanced technology offered by virtual reality may increase consistency and reduce variance experienced with subjective assessments (Schultheis & Rizzo).

•In addition to mimicking natural environments, virtual reality can allow the creation of safety scenarios that would be potentially dangerous and unethical to assess with individuals in real life (Schultheis & Rizzo; Yalon-Chamovitz & Weiss, 2007).

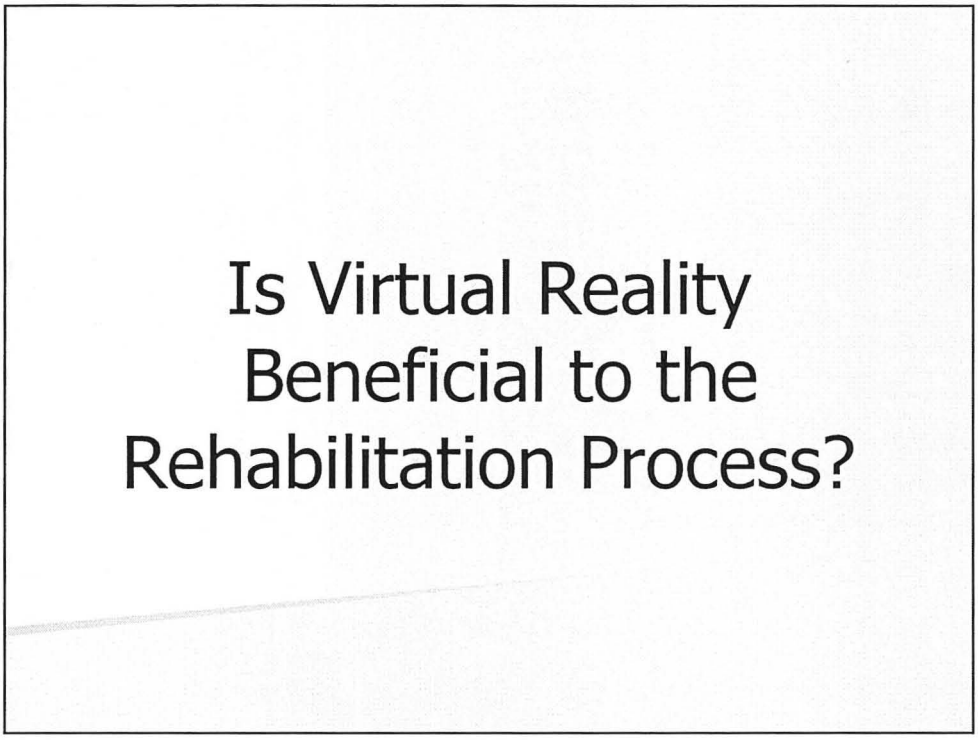
•To provide an example, think back to the example of the student drivers education course. Virtual reality is used to assess students abilities to react to various situations that may happen while driving. These scenarios may include weather conditions, pedestrians, or objects interfering with the driving path. These situations would be unethical to assess in real life as they would put individuals in potentially harmful situations. Through the utilization of virtual reality, the reaction of students can be assessed in a safe environment.

•Virtual reality can be utilized to assess cognitive areas such as attention, sequencing, visual perceptual skills, memory, and executive functioning (Weiss et al.)




•Virtual reality can provide "naturalistic" environments where individuals feel a sense of presence. A sense of presence allows individuals to focus strictly on the task allowing motor and cognitive skills to be trained or restored (Weiss et al., 2004).

•Virtual reality provides more opportunity to adapt conditions to mimic real life scenarios as well as allow therapists and other specialists to alter the environment to best fit the needs of the individual and to create challenges for the individual during treatment sessions (Schultheis & Rizzo, 2001; Weiss et al, 2004; Yalon-Chamovitz & Weiss, 2007). This concept not only allows the therapist to individualize treatment, which is beneficial when striving for client-centered practice, but also to make measured adjustments in complexity levels to assure the appropriate degree of challenge when striving towards goals (Schultheis & Rizzo).




You may be asking yourself this question, "Is virtual reality beneficial to the rehabilitation process?

Review of literature has identified virtual reality as providing various potential benefits when used in a rehabilitation setting.

# Benefits

- Increase Energy Expenditure
- Improve Balance
- Increase Postural Control
- Increase Upper Extremity Motor Control
- Increase Visual Perceptual Skills

(Deutsch, Borbely, Filler, Huhn & Guarrera-Bowlby, 2008; Graves, Stratton, Ridgers, & Cable, 2008; Green & Bavelier, 2007; Rand, Kantz, & Weiss, 2009)

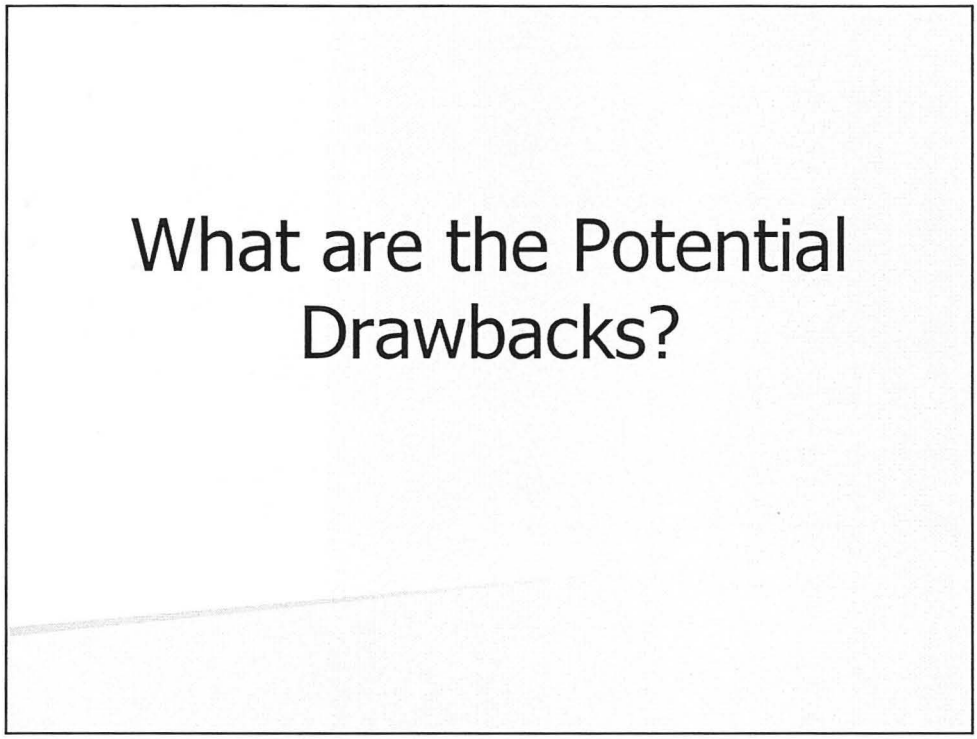
•Video games and virtual reality systems can produce health related changes such as increasing energy expenditure (Graves, Stratton, Ridgers, & Cable, 2008) improve balance and increase postural control (Deutsch, Borbely, Filler, Huhn and Guarrera-Bowlby, 2008) improve upper extremity motor control (Rand, Kantz, & Weiss, 2009) and improve visual perceptual skills (Green & Bavelier, 2007).

•ENERGY EXPENDITURE: Active video game play, such as using the Wii Sports games for the Nintendo Wii, can increase the amount of energy exhorted by an individual. Sedentary video games do not have this benefit (Graves et al., 2008) As a result of playing the Nintendo Wii, children and adults demonstrate an increase in movement, physical activity, and calories burned as well as decrease sedentary behaviors (Graves et al.)

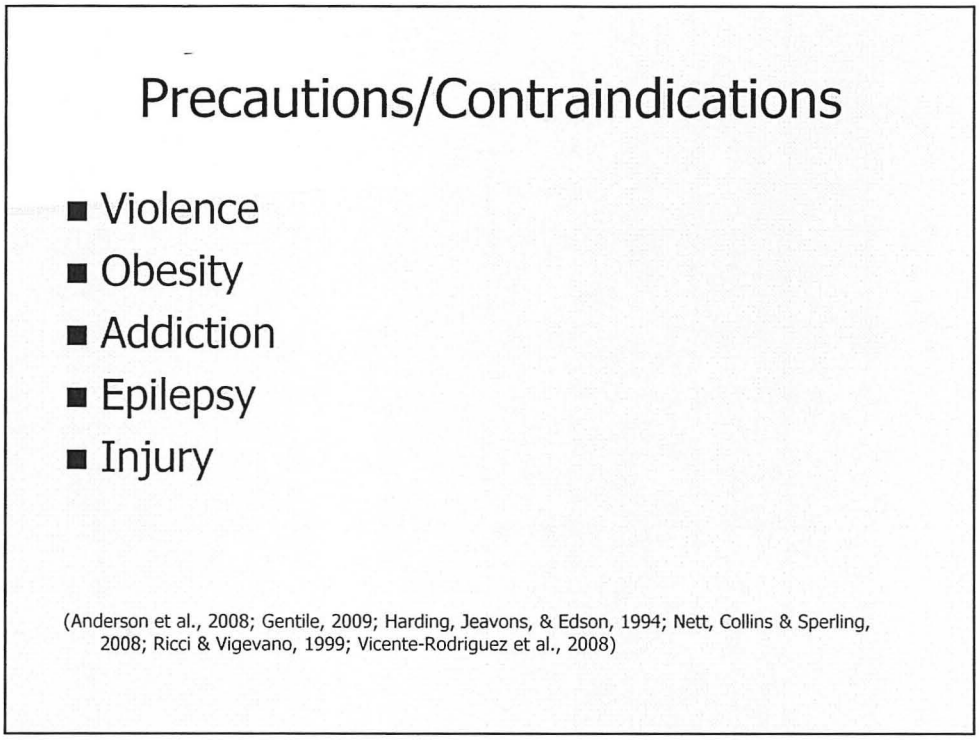
•BALANCE/POSTURAL CONTROL: A video game based balance program using the Nintendo Wii Fit, an assortment of interactive balance games linked to a balance board, not only increased performance on balance activities, but also decreased both anterior and posterior postural sway. Utilizing numerous Wii sports games on the Nintendo Wii gaming system reduced postural sway in an adolescent with cerebral palsy (Deutsch et al., 2008).

•UE MOTOR CONTROL: Virtual reality can be included in intervention focusing on increasing the function of an individual's upper extremities (Rand, Kantz, & Weiss, 2009). Incorporated movements such as hitting and catching, increase overall gross upper extremity movement improved Similarly, a virtual reality system simulating a supermarket demonstrated an increase in overall upper extremity function allowing bilateral use of upper extremities during daily activities (Rand et al.). Through the use of virtual reality systems and innovate controls, improvement can be demonstrated in bilateral hand and fine motor function such dexterity, grasp, and range of motion (Rand et al., 2009).

•VISUAL PERCEPTUAL SKILLS: Virtual reality has a positive effect on various aspects of vision as well including visual perception and visual processing (Green & Bavelier, 2007). Some areas of visual perception that have seen improvements as a result of the Nintendo Wii include visual discrimination, visual memory, visual-spatial relationships, visual form constancy, visual figure-ground, and visual closure. Video games can also enhance an individual's visual acuity, or ability to see objects clearly as well as their ability to discriminate singular objects from surrounding distractions (Green & Bavelier).




Identifying beneficial health related changes is important, however understanding the precautions and contraindications of using this technology is important to consider when making the decision to use this intervention strategy with clients.




•What are some concerns you have or may heard about video game use?

•A review of literature has identified these five areas as key precautions and/or contraindications of video game use.

•VIOLENCE: There have been many concerns about the content of video games and the violence associated with certain games. It was found that adolescents who regularly participated in violent video games, demonstrated aggressiveness, specifically physical aggression occurring later in life (Anderson et al., 2008).

•OBESITY: Adolescents who engaged in sedentary video game play and watched television experienced a higher body fat percentage and obesity risk (Vicente-Rodriguez et al., 2008).

•ADDICTION: Gentile (2009) found that 8.5% of a sample of children and adolescents were considered pathological gamers. Pathological gamers can be described as gamers that play more frequently and for longer periods of time. Gentile further explained that addiction must impact multiple aspects of an individual's life. Pathological gamers were more likely to report health problems, report problems focusing, and report feeling "addicted" to video games (Gentile).

•EPILEPSY: Due to the brightness of video screens, flashing graphics, and high contrast stimuli video games have been associated as a risk of causing seizures. Individuals with a history of epilepsy or who have experienced a previous seizure pose a higher risk of experiencing a seizure as a result of video game play (Ricci & Vigevano, 1999; Harding, Jeavons, & Edson, 1994).

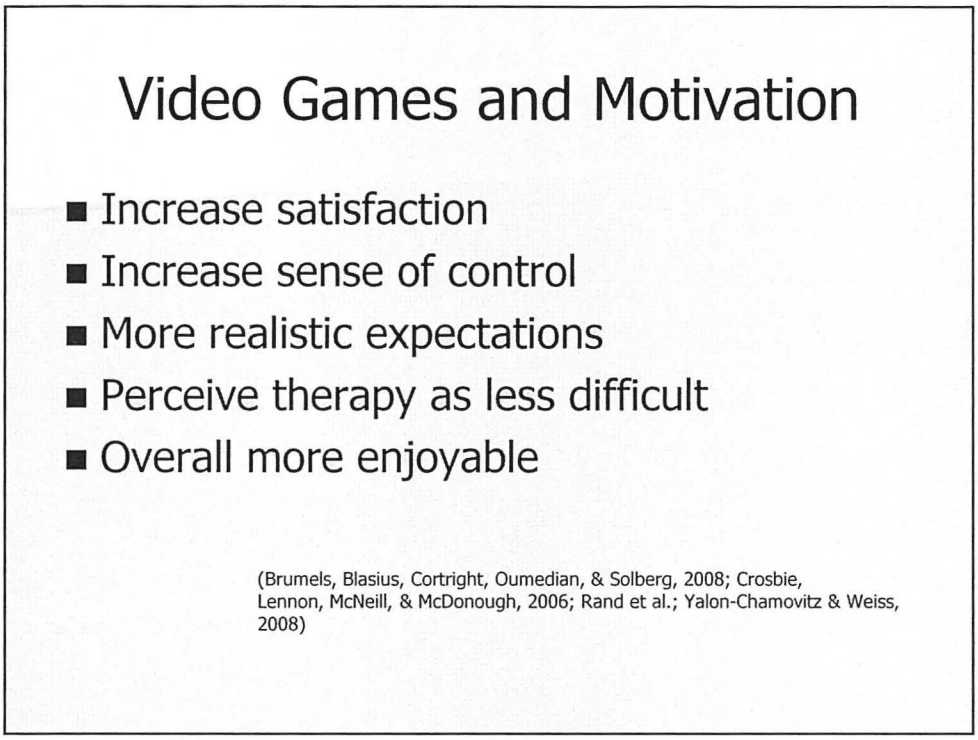
•INJURY: The Nintendo Wii utilizes a hand held controller that "allows the player to control the video game by sensing the player's spatial movements in three dimensions." (Nett et al., 2008, p. 481) In addition the controller is light weight and when paired with aggressive movements it increases the risk of injuries, muscle overuse, and muscle soreness (Nett et al.)

•Video games require repetitive motions and often players engage in them for numerous consecutive hours. The risk of injury and overuse of extremities increases when playing video games for consecutive hours with minimal or no rest breaks.

•Even though playing the Nintendo Wii sports games may require similar movements of the upper extremities, these games are not a substitution of regular sports games and require more repetition of specific movements than in a real sports game scenario.


•Video games are a recreational activity in which individuals are motivated to engage in due to feelings of "presence" in a virtual environment (Ryan et al., 2006, Yee, 2006). Video game play increases motivation through autonomy and competence resulting in a significant affect on enjoyment as well as intentions of future game play (Ryan et al.).

•Three central factors affecting gamers' motivation to play include the social component (establishing relationships), the immersion component (interacting completely with the game and the fantasy world), and the achievement component (competing to triumph over challenges and defeat opponents) (Yee). Although these components vary between individuals, they provide a foundation of driving factors in gamers' motivation to engage in video game play (Yee).




•Integrating the Nintendo Wii into rehabilitation may produce increased motivation and participation from clients.

•Virtual reality systems and video games can increase satisfaction by allowing individuals to feel a sense of control and enjoyment while working towards a goal (Brumels, Blasius, Cortright, Oumedian, & Solberg, 2008; Crosbie, Lennon, McNeill, & McDonough, 2006, Rand et al, 2009) With higher levels of satisfaction and enjoyment, individuals perceive virtual reality and/or video games to provide more achievable outcomes, and perceive the interventions as less difficult (Brumels et al.;Rand et al.; Yalon-Chamovitz & Weiss, 2008).

## What is the Nintendo Wii?

- The Nintendo Wii is a new generation active video gaming console that utilizes a wireless controller allowing players to incorporate gross motor and whole body movements as well as interact in a virtual context.

The Nintendo Wii is a revolutionized gaming system. Through the use of wireless controllers and interactive concepts, the Nintendo Wii provides an element of fun and entertainment for the whole family, in fact it is rated E for everyone!

## Nintendo Wii and Motivation

- The Nintendo Wii can be motivating and engaging for a variety of clients
- Engages clients physically and cognitively
- Allows control of environment
- Allows grading of activity
- Requires similar movements to real sports
- Encourages a social environment when played with other individuals.

(Drummond, 2008; Herz, 2009; Snider, 2008)

•Along with the many physical benefits, the Nintendo Wii can provide an engaging and motivating intervention option when addressing clients performance deficits.

•Due to the possibility of the Nintendo Wii being utilized by a variety of populations, occupational therapy has begun to include it as an intervention in the rehabilitation setting as well. It has been publicized as a new gaming experience, it appeals to a variety of populations, young to elderly (Herz, 2009; Snider, 2008; Drummond, 2008; ).

•The Wii particularly appeals to occupational therapy practitioners because it permits clients to participate in activities using physical and cognitive abilities that are similar to reality (Snider, 2008; Herz, 2009). Laurel Cargill Radley of the American Occupational Therapy Association states "Physical rehab clinic have used computer and video games for many years, but the Wii uses much more complex and much broader use of the movement…It's like a simulation machine" (Snider, para. 35).

•The client can become a part of an activity that he/she would like to do or needs to do while having a control over a virtual environment. Also, as the client improves while playing a specific game, the level becomes more difficult. Therefore, the activity to be graded specifically to the client and provides the appropriate level of challenge (Herz, 2009).

•The client must use specific movements to participate in a game that are equivalent to participate in the actual sport (i.e. simulation of a tennis serve or simulation of throwing a bowling ball) in order to progress in the game (Drummond, 2008).

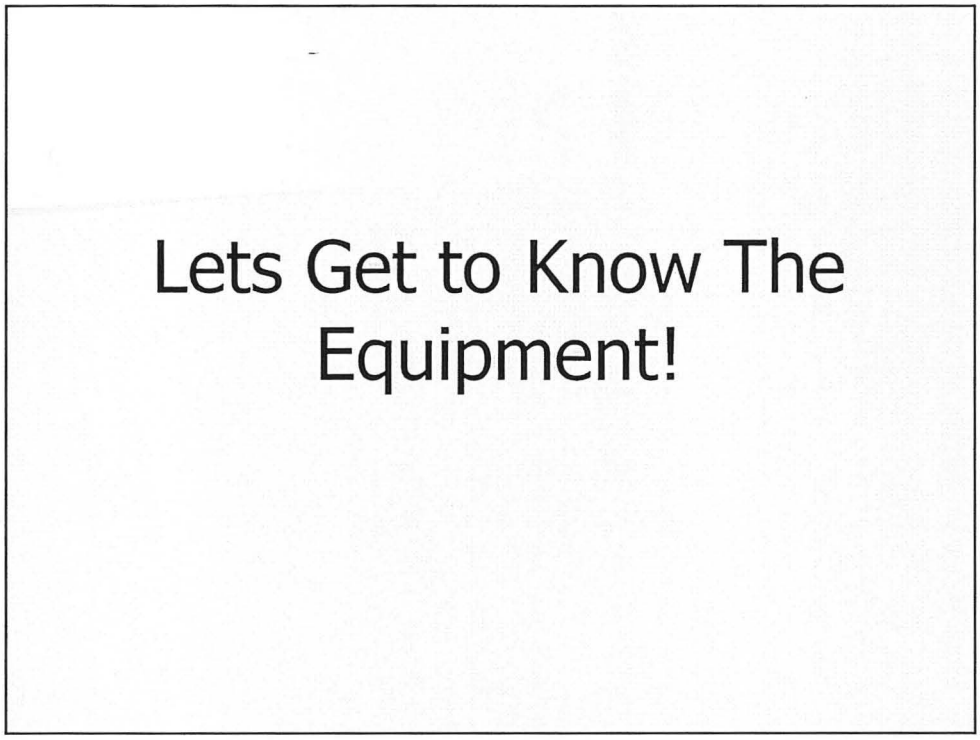
•Use of the Nintendo Wii does not replace occupation based activities, but address specific performance areas through a preparatory/purposeful activity that will help clients improve on areas needed to engage in occupational performance.

## What do you get with the Wii?

- Nintendo Wii Gaming Console
- Console Stand
- One Wii Remote
- One Wii Remote Jacket
- One Nunchuk Remote connection
- Wii Sports Game
- Sensor Bar
- AC Adapter
- TV Input/Wii AV Cable
- Two AA Batteries

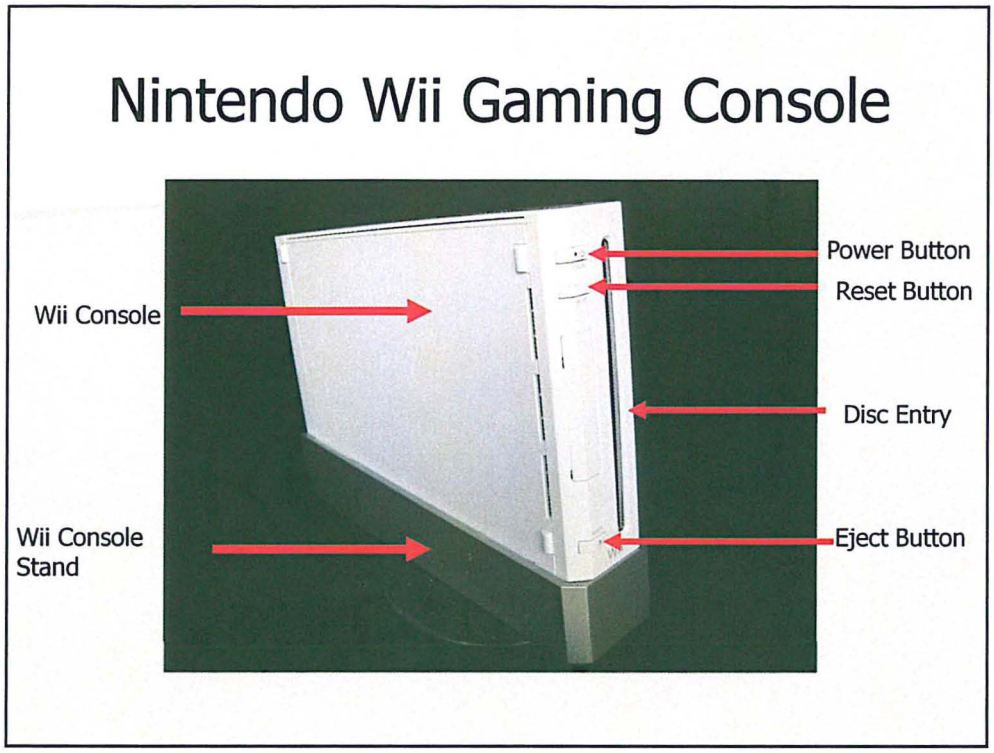
•The Nintendo Wii gaming console is currently priced at about $200. With the initial gaming console purchase you receive everything listed here. Accessories and additional equipment can be purchased if desired. It is recommended to purchase at least one additional Wii remote and Nunchuk attachment to allow more than one individual to play in order to promote social interaction.

•We will now go into a further explanation of the equipment that comes with the Nintendo Wii console.



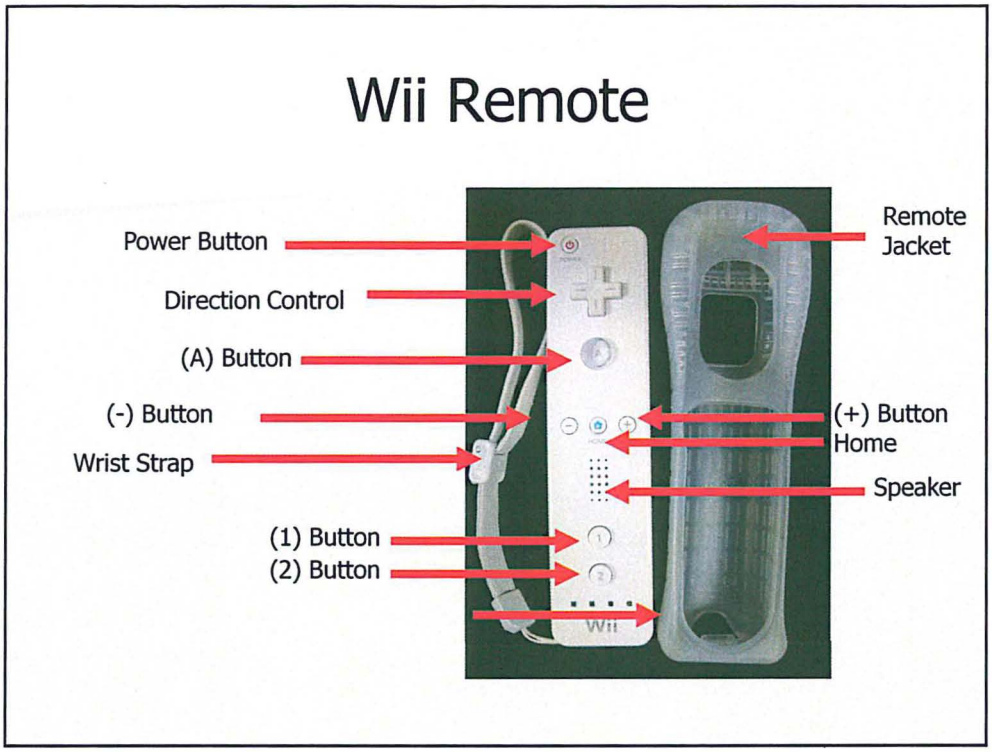

NOTE: For this section it would be helpful to have the equipment on hand.

After exploring the Nintendo Wii equipment, we will address the set up procedure of the system.




This is the Nintendo Wii gaming console. The console can sit either vertically or horizontally depending on the preference of the user. If space is limited the stand allows the console to sit vertically, otherwise it can lay horizontally.

The console it self has a power button allowing to turn it on or off, a reset button to reset the system and/or return to the main menu, and an eject button which ejects discs from the system. The entry for game discs is also located on the front of the console.




This is a picture of the Nintendo Wii Remote. For this particular session, we will identify the buttons that are used specifically with Nintendo Wii sports games.

Power Button: Turns the Wii Remote on or off

Direction Control: These arrows allow you to aim and/or move your character (for example bowling it allows you to move your character)

A Button: Used to confirm, triggers specific movements for different games

Plus Button: Open/Close the pause menu

Wrist Strap: The wrist strap should be fastened and worn every time the remote is used during play. Because many of the motions encourage rapid movement, the wrist strap prevents the Wii Remote from spontaneously being released from the hand due to a loss of grip. This prevents injuries to equipment and to others. It is important to remember NOT to let go of the remote during game play. To put on the wrist strap, open the level of the lock and put your hand through the strap. Tighten the strap so it will not fall off your wrist and lock the strap in place.
NOTE: Demonstrate how to do this for the audience.

Speaker: Produces sound with certain movements

Home: Open/close the HOME menu

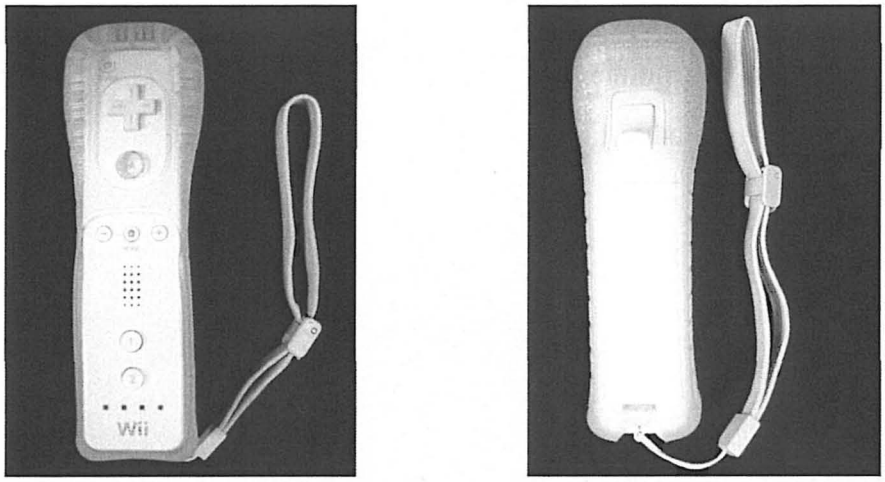
Remote Jacket:

1 Button: No specific purpose for Wii Sports

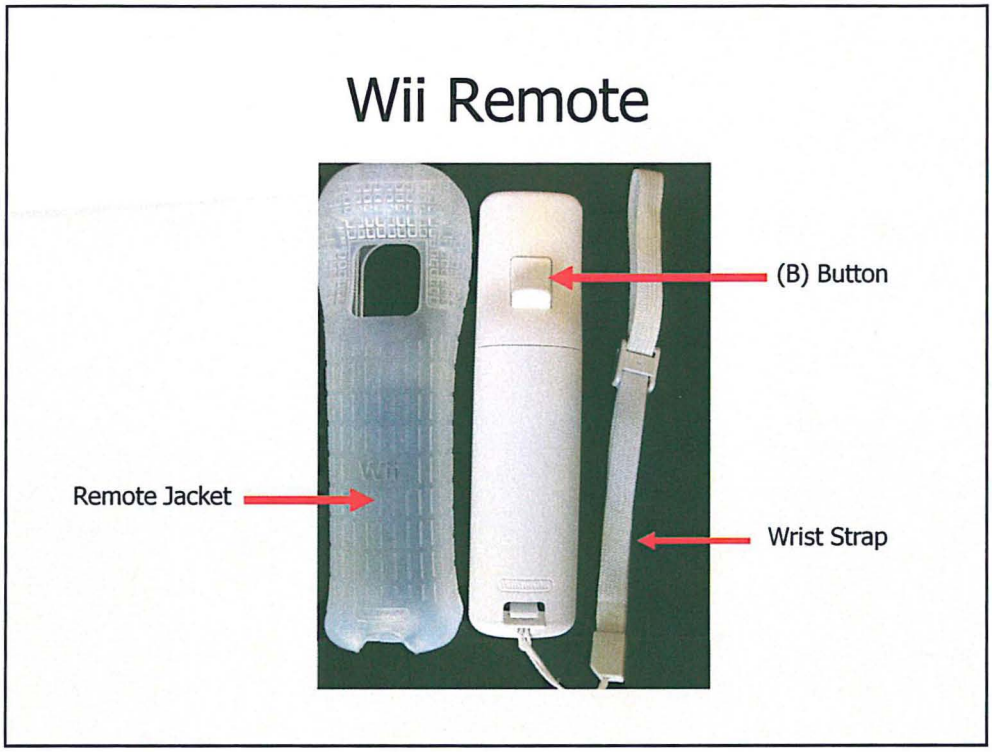
2 Button: No specific purpose for Wii Sports

Minus Button: No specific purpose for Wii Sports

# Wii Remote with Remote Jacket

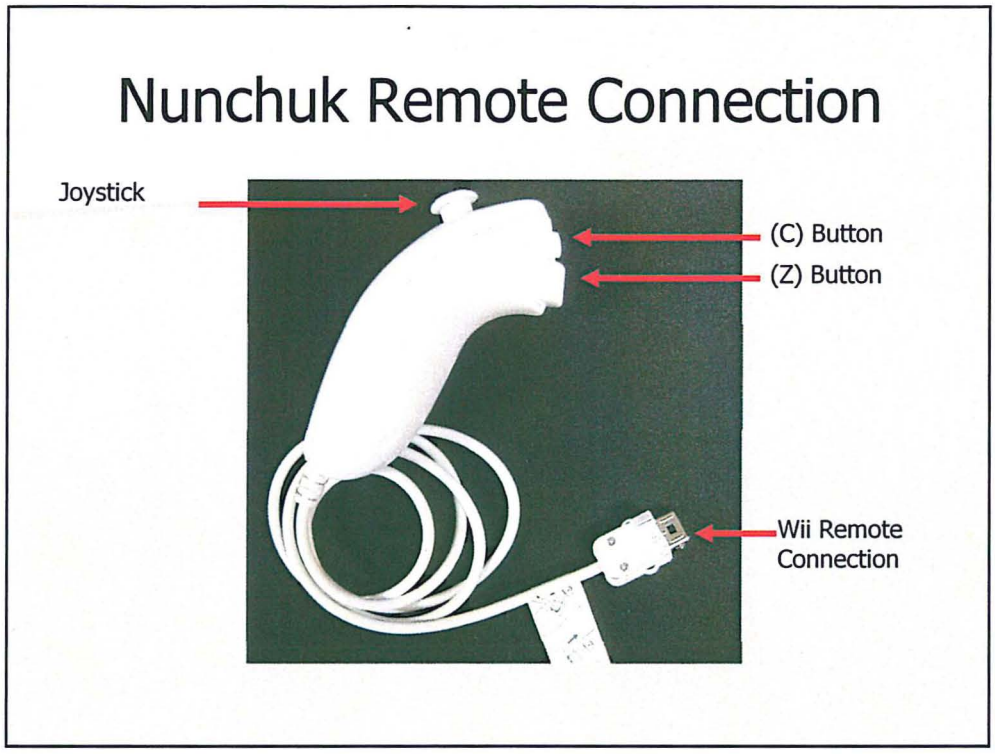



•A remote jacket for your Nintendo Wii remote comes preinstalled for the remote that comes with the initial console package. It is important to keep the remote jacked on the Wii remote at all times. It protects the remote from any damage as well as provides a cushioned grip for the user. The wrist strap and the remote jacket are both important protective devices that should be utilized with the remote during every use to protect the remote, objects, and other individuals from damage or injury.



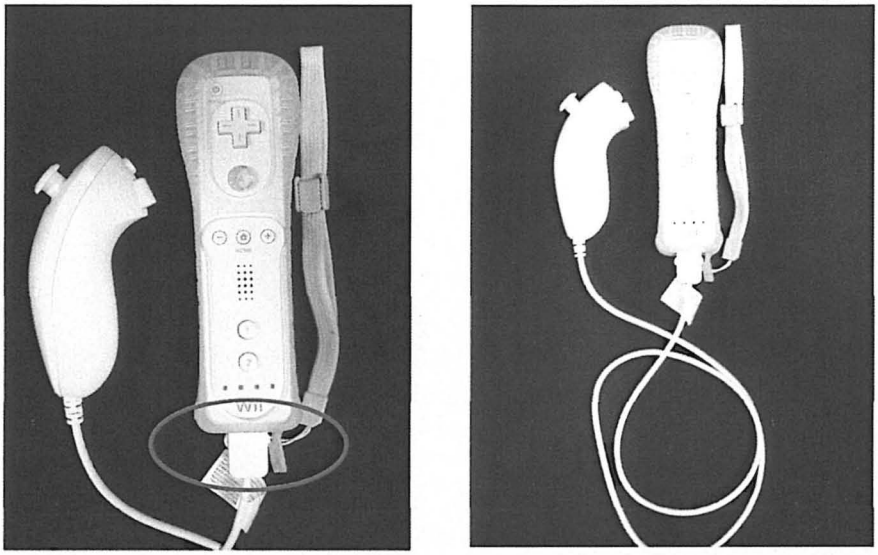

This is the back side of the Nintendo Wii remote. The only button located on the back side of the remote is the B button. This button is used to return to the previous screen, or can be used to initiate movements during games.

Again the remote jacket and wrist strap are labeled here as we would like to stress the importance of these protective devices.

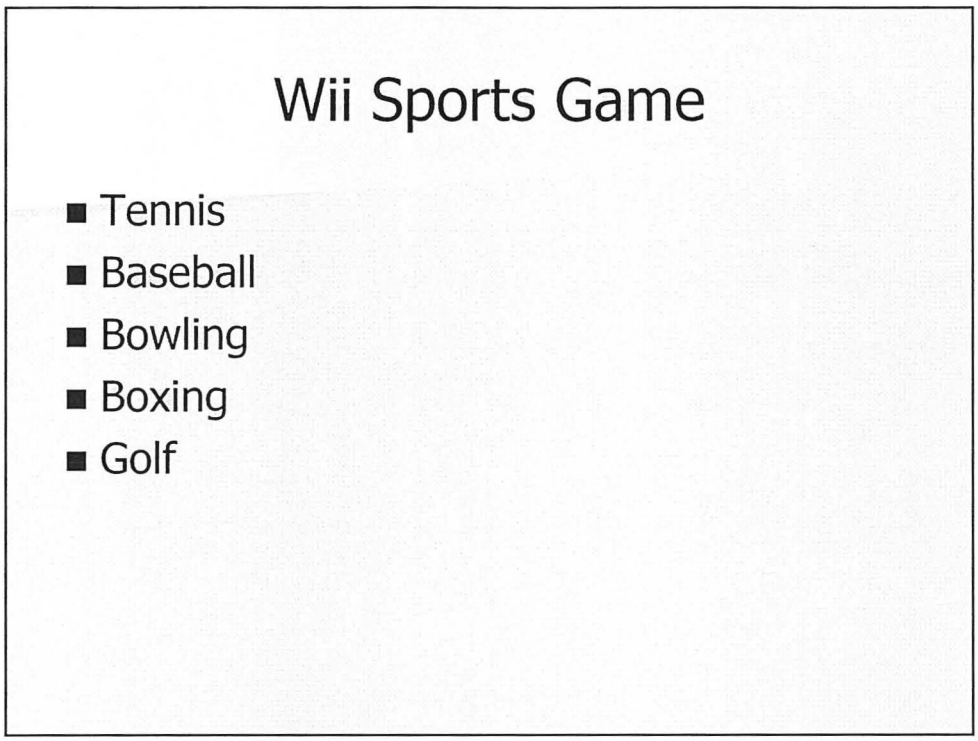



This is a picture of the nunchuk remote. This remote is connected to the Wii Remote by a cord that inserts in the bottom of the Wii remote. This remote is used as an attachment in the boxing game only to allow bilateral use of upper extremities.

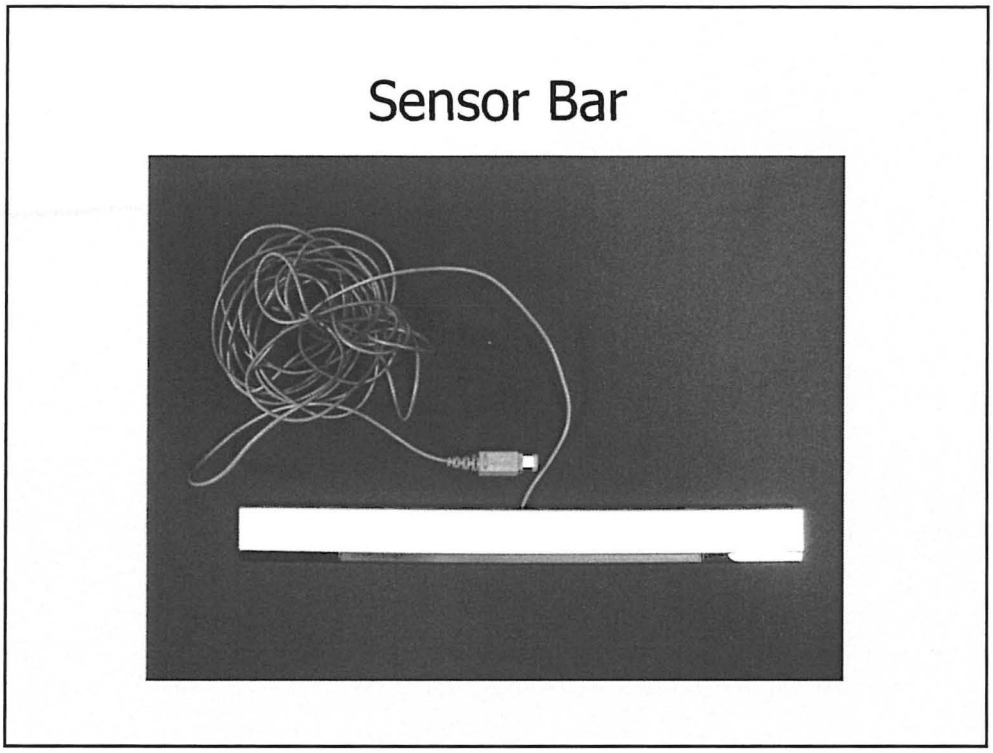
# Nunchuk Remote Control



These pictures show how the nunchuk remote is attached to the Wii remote.

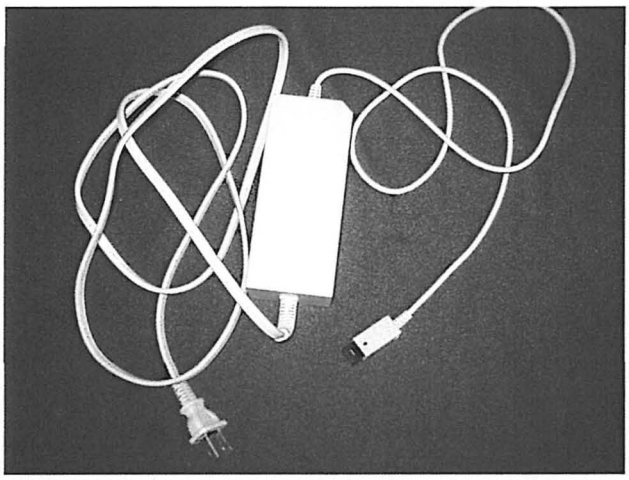



The Nintendo Wii Sports game disc comes with the initial console purchase. Wii sports includes tennis, baseball, bowling, boxing, and golf. These games will be explore in further detail later in the presentation.



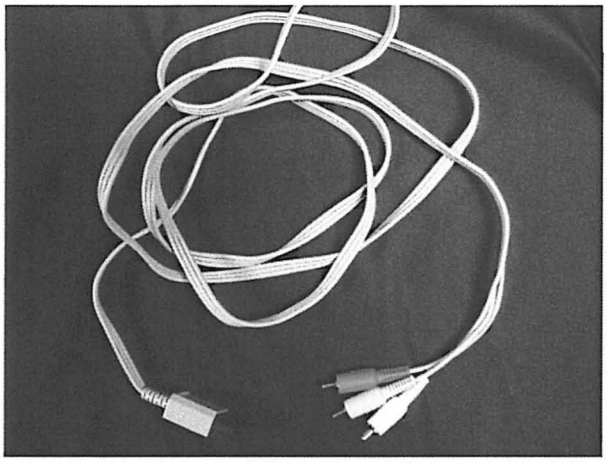

The sensor bar is an important part of the console as it detects the movements of the Wii Remote in order to complete the actions of the game.

# AC Adaptor

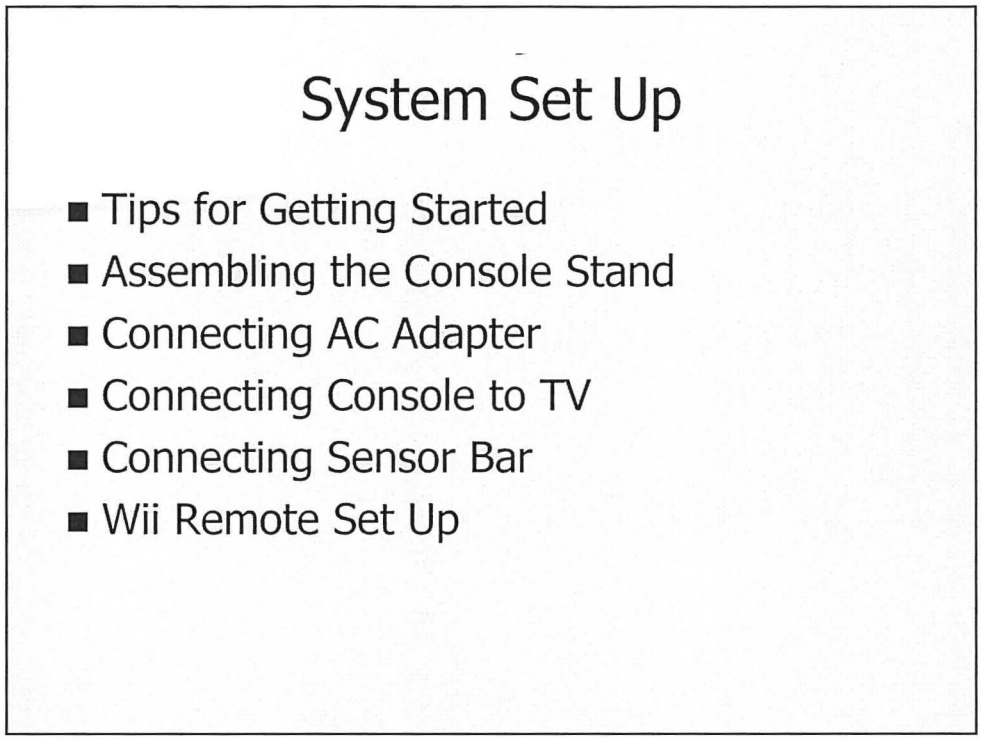


The AC Adapter supplies power to the console by connecting the Nintendo Wii gaming console to a wall outlet.

# TV Audio/Video Inputs

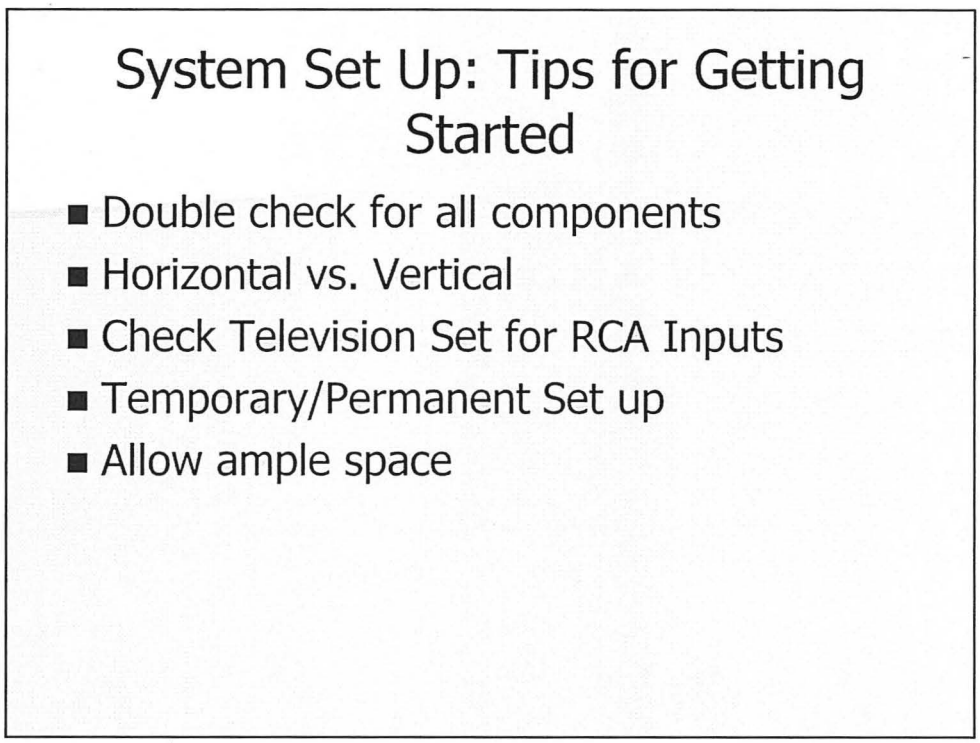


The TV audio/video inputs connects the Nintendo Wii to the television set allowing the visual and auditory information to be transferred from the video game to the television screen.




NOTE: Demonstration on actual set up of the system will help enhance the learning experience and allow participates to actually see how the system is hooked up.

These are simplified steps that instruct you on how to set up your Nintendo Wii gaming console and each will be addressed. Further explanation can be found in the Nintendo Wii operations manual. There is also a support web site available for system set up needs (support.nintendo.com) or you can call 1-800-255-3700.




•Check to make sure you have all pieces required for set up and use.

•The Nintendo Wii can sit either horizontally or vertically in the provided stand. This decision should be made based on the amount of space you have as the console should be in a space allowing ventilation.

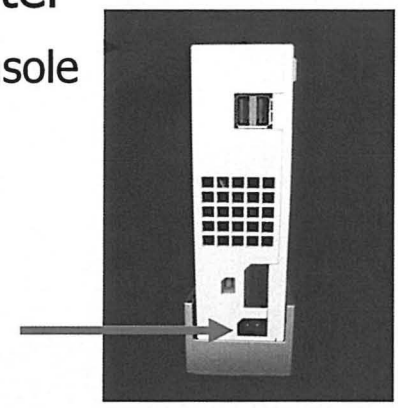
•Make sure the television set you will be using is close to an outlet and has RCA Inputs (inputs for audio and video components) these are red, white, and yellow. If your television is older and you do not have these components you will need to pick up an RF Modulator $20 -$40.

•Having an area to permanently set up the Nintendo Wii is recommended however it is not required. The Nintendo Wii can be set up rather quickly, making it easy to store if a permanent set up is not an option.

•The optimal distance for Wii play is 3 to 10 feet directly in front of the television screen. You should also allow ample room for the individual to play the Wii as the motions may take up quite a bit of space. It is recommended to leave at least 6 feet in all directions of the player to ensure adequate space and prevent injury to others.

## System Set Up: Connecting AC Adapter

- Insert Wii AV into Console as pictured by the red arrow



- Plug opposite end into Wall Outlet

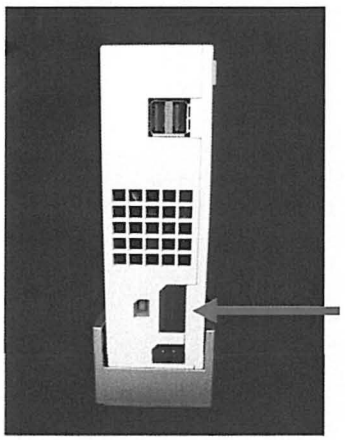
•To provide the Nintendo Wii gaming console with power you need to connect the Wii console to a nearby wall outlet.

•The AC Adapter can be hooked up by plugging the Wii AV cable end into the Nintendo Wii console.

•Plug the AC adapter into a nearby wall outlet. Make sure the wall outlet is located within a short distance from the console so that cords are safely tucked away and are not a possible fall risk.

## System Set Up: Connecting Console to TV

- Connect the RCA cables to the television
  - Correspond colors of cables with colors of inputs on TV
- Connect the opposite end to the Nintendo Wii as the red arrow indicates



•In order to receive visual and audio feedback from playing the Nintendo Wii game, you need to connect your Nintendo Wii gaming console to your television set.

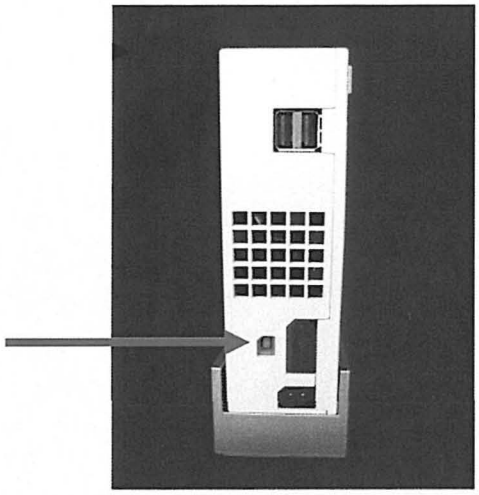
•Connect the RCA cables on the cord into the corresponding colored inputs on the television set (red, yellow, white).

•Connect the opposite end of the cable into the designated spot on the back of the Wii console as indicated by the red arrow.

•The AV cable provided is the only cable that will work with this system to connect it to the television screen.

## System Set Up: Connecting Sensor Bar

- Insert sensor bar plug into identified area on console



•The sensor bar receives input from the wireless remote controllers allowing the actions of the player to be depicted on the screen.

•The sensor bar needs to be connected to the console in order to deliver this input.

•Plug the sensor bar into the orange sensor bar connecter on the back of the Wii console.

## System Set Up: Connecting Sensor Bar

- Remove the protective sheet from sticky squares on the bottom the sensor
- Stick on top of television or on television stand
  - Note: the sensor bar should lay flat and should be the optimum level to pick up movements from remotes

•When setting up the system for the first time, the sensor bar will come with protective sheets covering the adhesive squares used to stick the sensor bar to the television. In order to install the sensor bar, you must remove the sheets. If this is not the first time it has been installed, the sheets will no longer need to be removed.

•Select a place to install the sensor bar that will allow it to pick up the majority of movements from the player (about waist to chest level). The sensor bar should be placed in alignment with the center of the television and should be installed on a level surface. If the sensor bar is at an angle it will not pick up movements correctly.

## System Set Up: Wii Remote Set Up

- Remove Wii Remote Jacket to install batteries
- Syncing Wii Remote
  - Turn on console by pressing "power" button
  - Press and release red sync buttons
    - Located on back of Wii Console
    - Located in the battery chamber on the Wii Remote
  - NOTE: The remote that comes with your system will already by synced, use this to sync additional remotes.

•In order to set up the Wii Remotes, you need to install the batteries. As the remote jacket comes preinstalled, remove the bottom of the remote jacket to get to the battery carriage to install the batteries. Make sure the batteries are installed with plus and minus ends in the proper places.

•The remote that you receive with your console will already be synced with the gaming console. Any additional remotes will have to be synced to the gaming system so that information from the remote can be detected by the sensor and projected onto the screen.

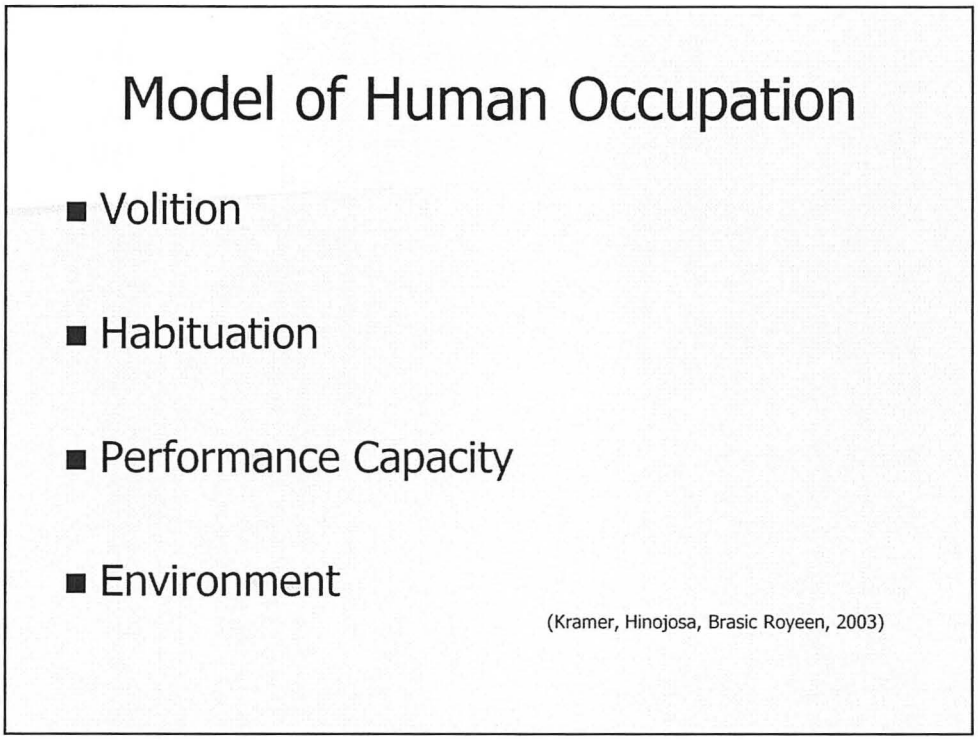
•If you are using an additional remote and it needs to be synced, you need to install the batteries first and then turn on the console by pressing the "power" button.

•Next you need to simultaneously press and release the sync buttons on both the Nintendo Wii console and the Wii remote. There is a compartment on the back of the gaming console that houses the red sync button. Open the door on the back of the console to access this button. The red sync button for the Wii remote is located in the battery chamber. Remove the remote jacket and open the battery chamber door to access this button.

•Press the buttons simultaneously to sync the remote to the console.


* Ask if individuals have any questions regarding equipment or system set-up.

# How to approach using the Wii in therapy!




•The suggested theoretical approach to utilize while implementing the Nintendo Wii into therapy is the Model Of Human Occupation.

This model was chosen because of its strong emphasis on core concepts including volition, habituation, and performance capacity as well as the impact of environment (Kramer, Hinojosa, Brasic Royeen, 2003).

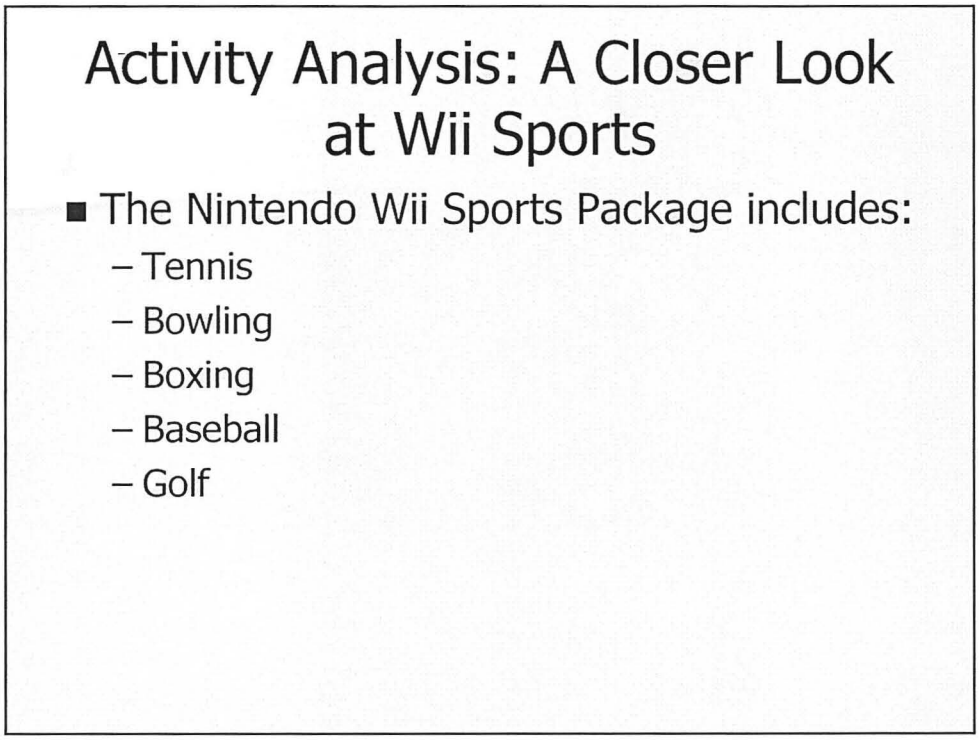
•Before suggesting this intervention strategy with clients, it is important to establish a rapport with clients and identify what is important to your client, what they find enjoyable, and what their perception and awareness level is on their current abilities. By identifying a clients volition, you can identify whether or not using the Nintendo Wii would be appropriate for the particular client.

> •It is also important to note that virtual reality and Video games can have a positive effect on motivation levels and client satisfaction. We will discuss this in further detail later.

•In addition to motivational factors, it is important to identify a clients habituation. By learning more about an individuals habits, roles, and routines, you can identify their patterns of occupational performance. Knowing a client's style of behavior, how they use their time, and how they perform activities, will be beneficial when deciding if the Nintendo Wii is appropriate and introducing it to clients.

•The ability for an individual to engage in an activity relies on their performance skills. The Nintendo Wii can be utilized to address several physical and cognitive skills in a variety of patient diagnoses. We will go more in depth as to how the Nintendo Wii can address performance skills in just a few moments. At this time, it is important to highlight the importance of assessing your clients current abilities to perform their occupations, and identify any skills needing improvement.

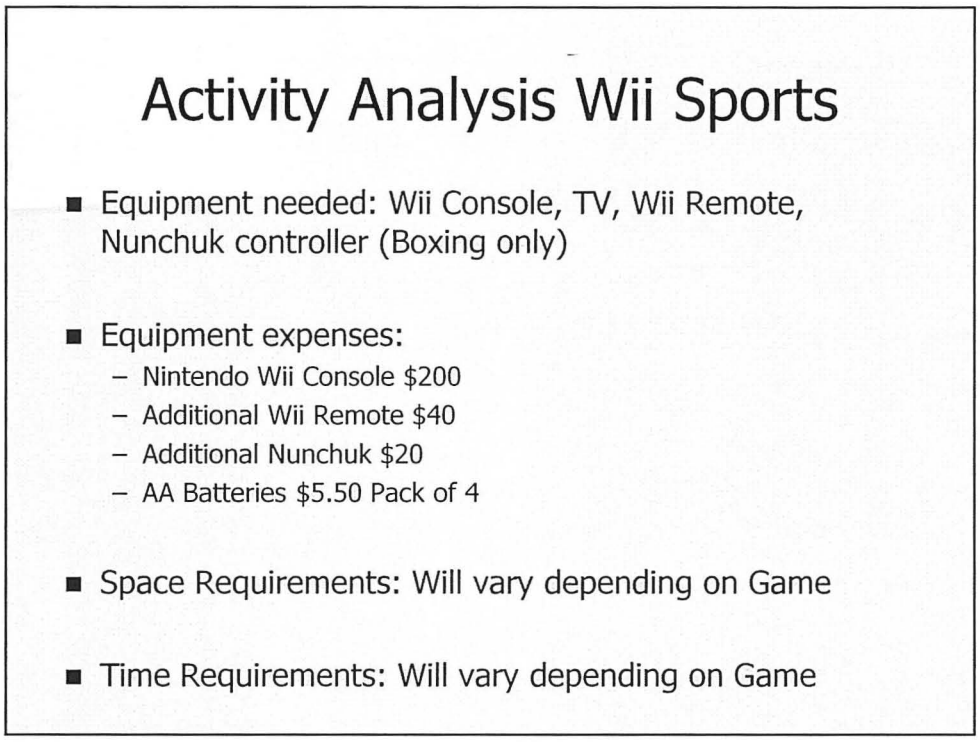
•Client's environments also impact their occupational performance. As previously mentioned, virtual reality allows individuals to control the environment. While using the Nintendo Wii in therapy sessions, therapists can adapt and modify the environment in order to promote specific performance skills, or challenge clients to overcome potential environmental barriers.




•Included in the Nintendo Wii gaming console, is the Nintendo Wii Sports game which includes tennis, bowling, boxing, baseball, and golf.

• An activity analysis of each sports game was completed to identify the performance skills needed to participate in each game. This activity analysis is located in your handouts packet. Feel free to refer to it, ask questions, and take notes.

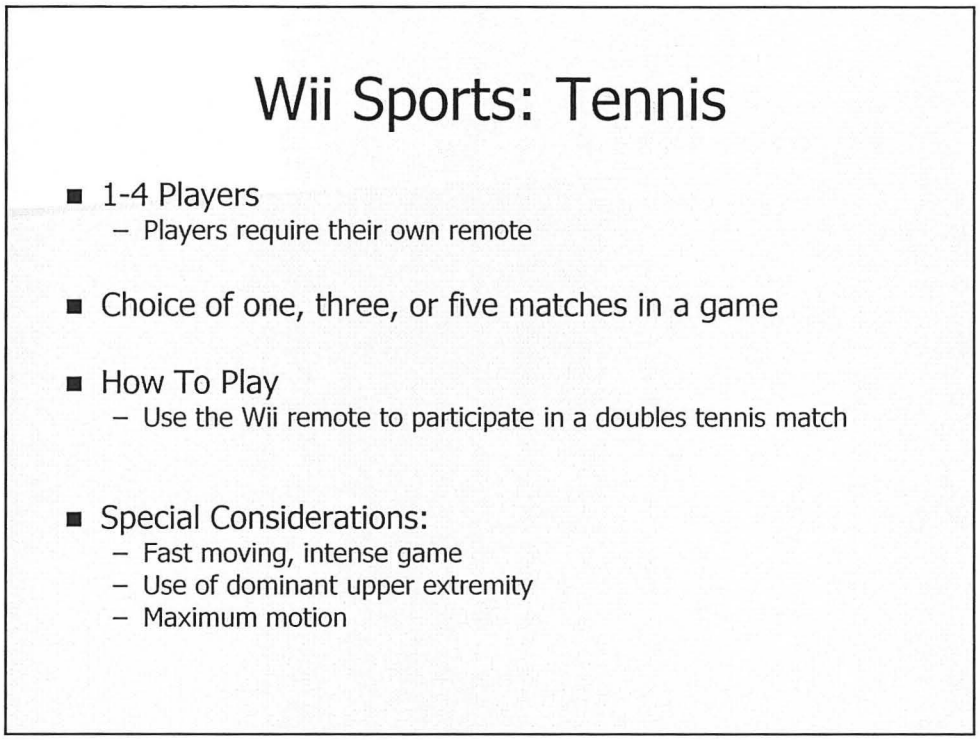
•We will now discuss the logistics of each game.




•In order to play Wii sports, you need the following equipment: Nintendo Wii console, a television set, at least one Nintendo Wii remote, and a nunchuk controller. The nunchuk controller is needed in order to participate in the boxing game.

•The equipment expenses are listed. Additional accessories may be purchased, but are not required. These are available at various retailers for various prices.

•Space requirements will vary depending on the game and the client. For safety reasons it is recommended that each individual have at least 6 feet of room in all directions in order to play the game. This can be adapted for individuals who may need assistance from the therapist.



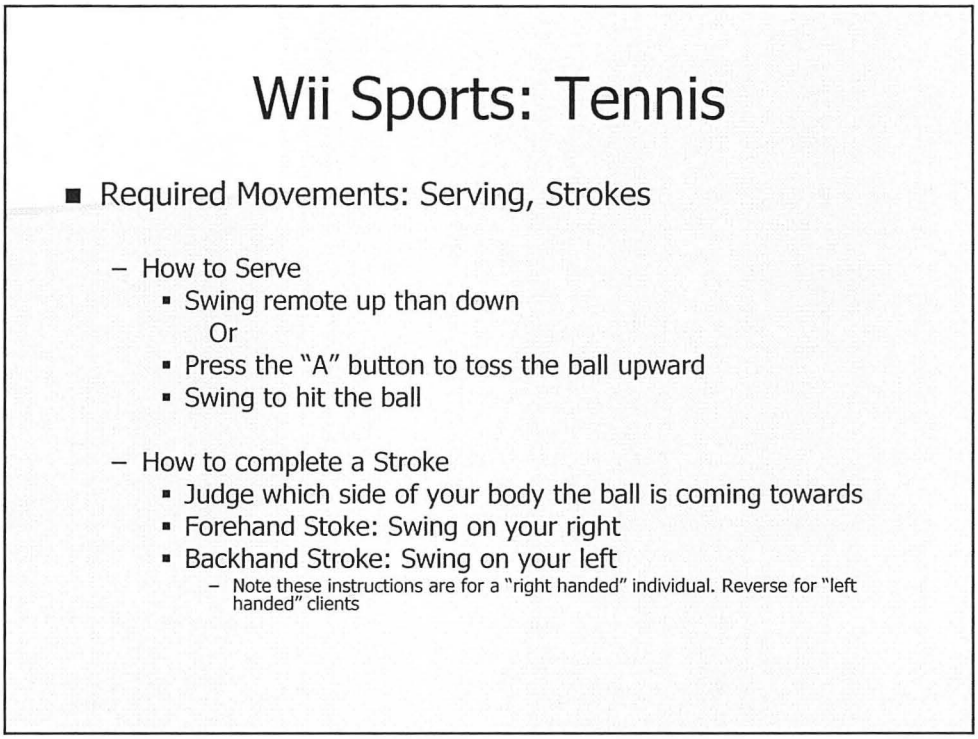

•Wii sports tennis accommodates up to 4 players which allows it to be a great promoter for social interaction.

•This game allows you to choose either one, three, or five matches per game.

•To play this game, individuals swing the Wii remote like they would in a real tennis game to compete in a simulated doubles tennis match.

•As individuals progress, they can move up in levels automatically and play more difficult opponents.

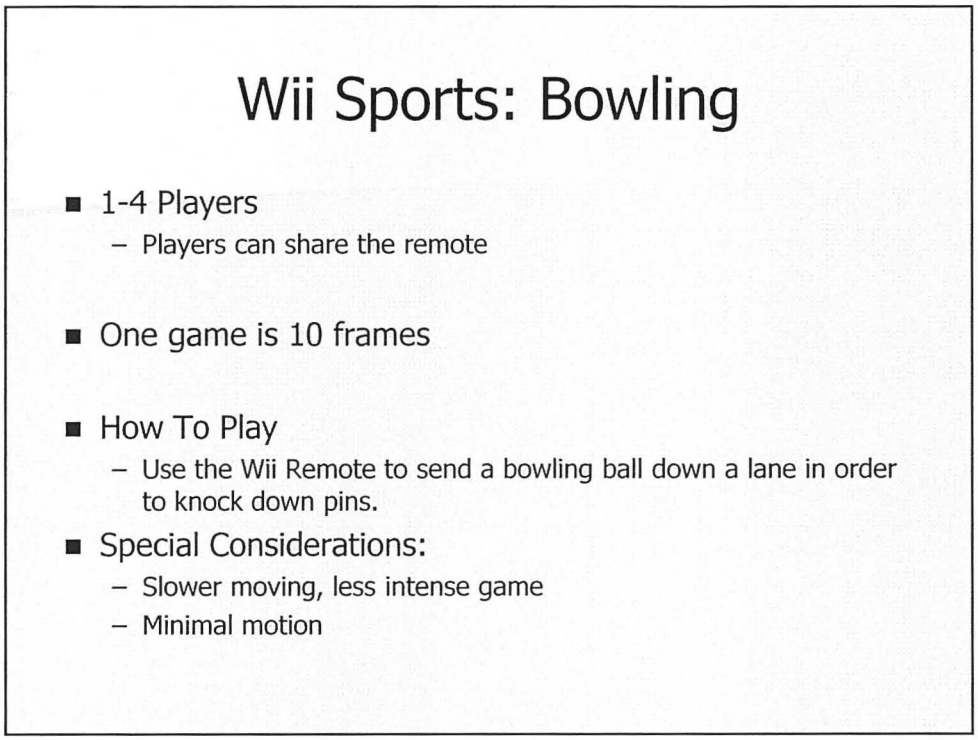
Requires great deal of gross motor movement and total body energy – dependent on individual playing. Because the game judges how hard the ball is hit and it correlates with ball movement on the screen. Competitive individuals should be cautioned not to exert themselves while playing the game i.e. injury of shoulder




•It is not required to press any buttons in order to play this game, however there is an option to serve by pressing the "A" button.

•The two required movements needed to complete the game are serves and strokes.

Note: Demonstration of required movements will enhance the learning experience.




•Wii bowling accommodates up to 4 players. This game is less vigorous and is excellent in a group setting. It can be played in sitting or in standing.

•Players take turns to use Wii remote to simulate bowling a ball down a lane to knock down pins. The game lasts for 10 frames.

There is time allotted between frames

Requires use of dominant upper extremity, less gross motor movement, and total body energy

# Wii Sports: Bowling

- Required Movements: Upward Swing, Button Release, Moving/Aiming
  - Aiming
    - Use the arrow left/right keys to
  - Bowling the ball
    - Start holding Wii Remote with arm at side
    - Bring arm up to chest while holding "B" button
    - Swing arm backward
    - Swing arm forward and release "B" button to release the ball

•Bowling allows you to move your character to aim at where you would like to throw the ball. Then you complete and upward swing and release a button to bowl the ball down the alley. We will now explain how to complete these in further detail.

• Left and right arrows allow you to move to decide where to stand and where to aim. The up button on the direction control pad allows you to zoom. The A button allows you to switch modes.

# Wii Sports: Boxing

- 1-2 Players
- One Match consists of three one minute rounds
- How to Play
  - Use the Wii remote and nunchuk to compete in a boxing match with another player
- Special Considerations:
  - Fast moving, intense game
  - Use of both upper extremities
  - Maximum motion

•Boxing uses both the Wii Remote and the Nunchuk connection. Boxing allows 1-2 players. Due to the high endurance required to complete this activity it is recommended that only one client play at a time if playing in standing. If two therapists are available to monitor two clients while they are playing in standing than two is ok. If players are playing seated, up to two players can play safely while monitored by one therapist.

•As individuals progress, they can move up in levels automatically and play more difficult opponents.

•Requires great deal of gross motor movement and total body energy. Because the game judges how hard the player punches and it correlates with fist movement on the screen. Competitive individuals should be cautioned not to exert themselves while playing the game i.e. injury of shoulder

# Wii Sports: Boxing

- Required movements: Punch, Block, Shifting Positions
  - How To Punch
    - Hold Wii Remote in your dominant hand and Nunchuk controller in the other
    - Thrust arm forward one at a time in a "punching" motion
    - You can aim by punching upward (head) or downward (body)
  - How to Block
    - Hold the Wii Remote and Nunchuk in front of you to block
  - How to Dodge
    - Shift your body forward, backward, left, right to dodge opponent

•This game can be played in sitting or standing. Playing while standing requires a higher level of endurance, balance, and postural stability.

•This game incorporates several movements of the upper extremities as well as the trunk. The upper extremities are used to punch the opponent and to block the opponents punches. The client can also shift their trunk in various directions to dodge punches from their opponents.

•We will now explain how to complete these movements in further detail.

# Wii Sports: Baseball

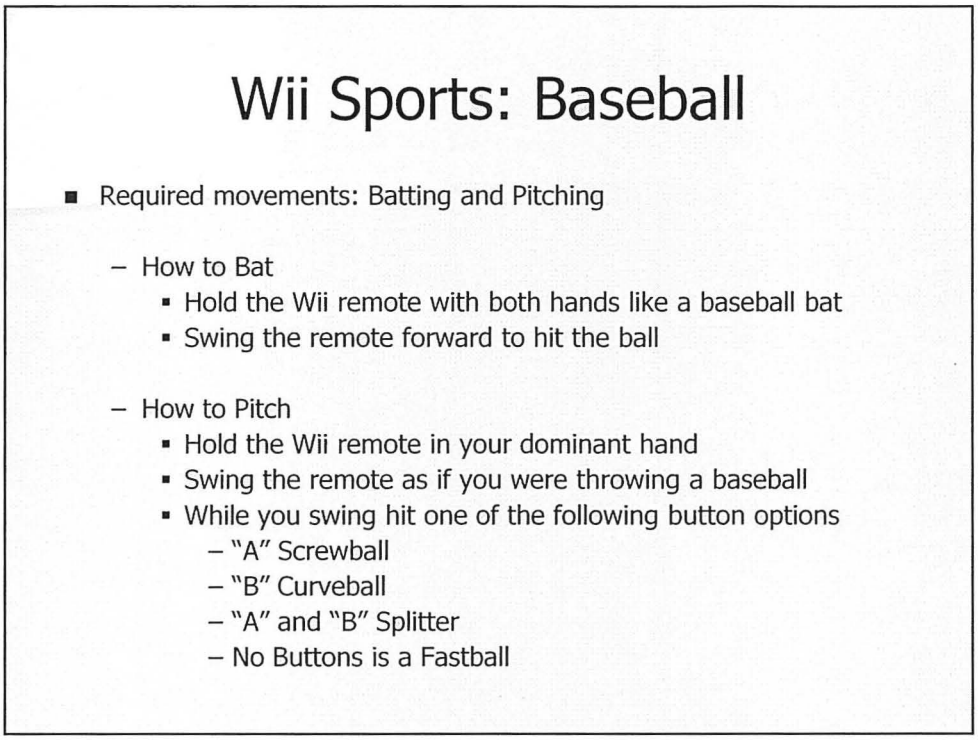
- 1-2 Players
- Game is three innings, players take turns batting and pitching
- How to Play
  - Running and out fielding is done automatically
  - Each player is responsible for batting and pitching
- Special Considerations:
  - Fast moving game
  - Use of both upper extremities
  - Moderate motion

•Baseball allows 1-2 players. If you have 2 players, each will need their own Wii remote.

•This game can be completed in sitting or standing. If you have two players who are both standing, you should have two therapists monitoring for safety.

•The game goes for three innings, in which each player has a turn to pitch and to bat. If one player scores five runs more than their opponent the game is over.

•Because the game judges how hard the ball is thrown and it correlates with ball movement on the screen. Competitive individuals should be cautioned not to exert themselves while playing the game i.e. injury of shoulder




This game requires to movements batting and pitching.

Note: During batting, timing is important. In order to make contact with the ball, your goal is to gently swing the remote when the ball crosses the plate.

During pitching, the speed of the ball is determined by how quickly you swing the Wii remote.


•Golf allows up four players. In this game players can share the same Wii remote.

•This game can be played in sitting or in standing. It allows you to choose a 3 or 9 hole course with three varying expertise levels. The player with the lowest number of strokes at the end wins the game.

•There is time allotted between strokes and there is less gross motor movement and total body energy.

# Wii Sports: Golf

- Required Movements: Swinging, Putting
  - How to Swing
    - Position your body allowing your non dominant side to be aligned with TV set.
    - Hold the Wii Remote with both hands in front of you like a golf club
    - Slowly bring both arms back towards your dominant shoulder while holding down the "A" button"
    - Swing arms down in front of you and up to the opposite shoulder
      - Note: The harder you swing the farther the ball will travel
  - How to Put
    - Putting requires the same position and movement as the golf swing
      - Note: Swing more softly and bring the remote just past your hip

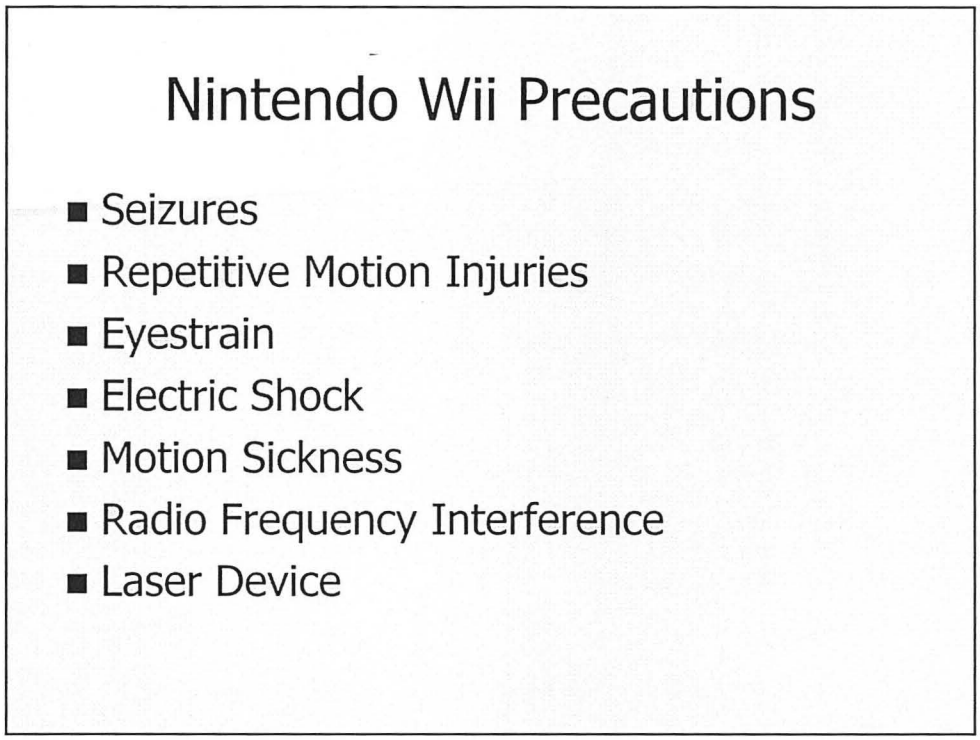
•There are two required movements to participate in this game swinging and putting.

•How to Swing

•How to Put

•You can use the right and left directional control to select the direction you would like to hit. The up and down directions allow you to select a club to use.

•Pressing the 1 button and 2 buttons will switch the camera angles on the screen.




These precautions were obtained from the official Nintendo Wii's Operation Manual, refer to the manual for more detail.

•SEIZURES: As previously mentioned, the brightness of video screens, flashing graphics, and the high contrast stimuli associated with video game play may trigger seizures. Individuals with a history of seizures or a seizure related diagnosis should consult their physician before playing.

- Stop playing immediately and check with a physician if the following symptoms are experienced: Convulsions, altered vision, involuntary movements, disorientation, loss of awareness, eye and/or muscle twitching

•REPETITIVE MOTION INJURIES/EYESTRAIN: Overuse and consecutive increase the risk of tendonitis, carpal tunnel syndrome, eye strain, skin irritation

- Recommendations: Avoid excessive play and take frequent breaks. If the client experiences tingling, numbness, burning, and or stiffness discontinue the intervention.

•ELECTRIC SHOCK: To avoid electric shock do not use during lightning storm, do not use if cords are damaged, use only the cords and equipment that came with the original system, ensure that cords are properly plugged in, and always power the system off before unplugging any cords.

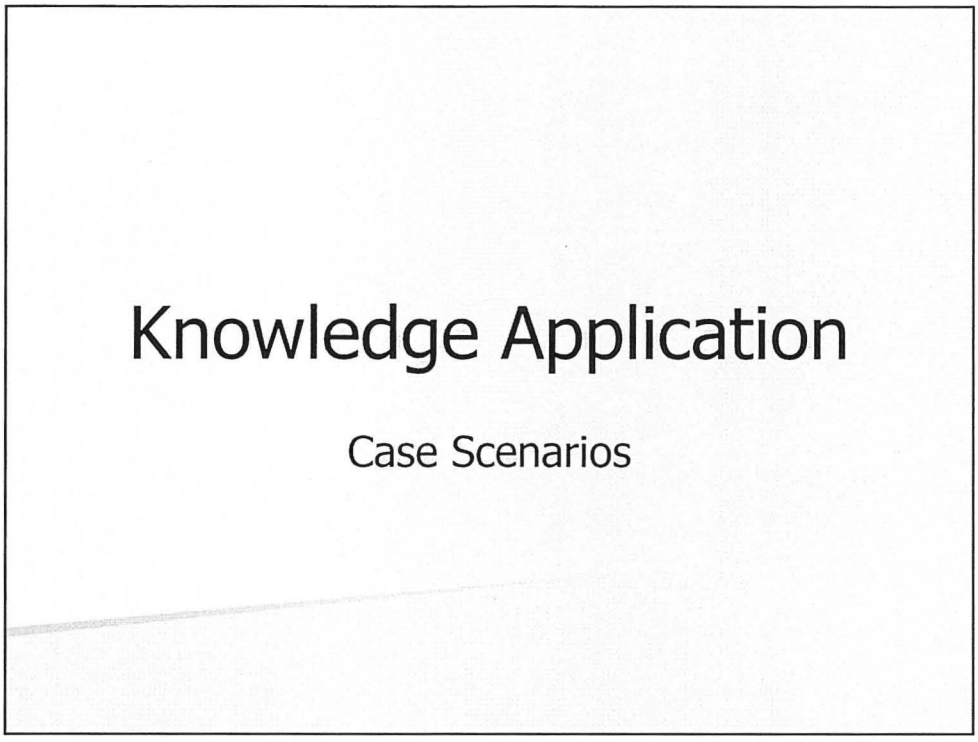
•MOTION SICKNESS: Motion sickness and/or nausea may be a symptom of virtual reality use. If your client experiences these feelings, discontinue the intervention and allow the client to rest.

•RADIO FREQUENCY INTERFERENCE: Frequency waves from the system may interfere with pacemakers or other medical devices that are implanted. Consult a physician before using the Nintendo Wii. The Wii console and remote should be at least 9 inches from a pacemaker.

•LASER DEVICE: Do NOT attempt to take apart the console.


These are some examples of adaptations that can be made in order to facilitate performance skills for individual clients.

See activity analysis chart and suggested therapy approach chart




•Refer to case study handouts

## Other Recommended Games

- Wii Fit
  - Balance, coordination, postural control
- Wii Play
  - Fine motor skills, visual perceptual skills
- Cooking Mama
  - Follow recipes
  - Simulate actual cooking steps (i.e.. chopping, cutting, pan fry, etc)

These are some other recommended games that could be utilized in a rehabilitation setting. Use your own critical thinking skills to analyze the games and adapt to fit the clients needs.

Any Questions?

# Thank you!

Please feel free to take this time
to trial the Nintendo Wii

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# Appendix B:

# In-Service Handouts

# Integrating the Nintendo Wii into Therapy: Resources for Occupational Therapy Practitioners

By Ashley Bowersox and Sarah Lund

## Objectives

- Following this in-service and participation in case studies, participants will be able to:
  - Describe the Nintendo Wii System
  - Identify the equipment and demonstrate ability to set up system
  - Identify precautions and contraindicating populations
  - Demonstrate clinical reasoning in identifying ways to integrate the Nintendo Wii into occupational therapy intervention
  - Adapt and/or modify to fit the needs of various physical disabilities populations
  - Describe how to integrate the Model of Human Occupation into treatment with clients using the Nintendo Wii

## What is Virtual Reality?

- A technological form of information exchange
- Interaction between an individual and a simulated environment
- Computer screens, joysticks, tracking gloves, head mounted displays, remotes, three-dimensional walls, etc.
- Simulated environments and immersion

(Schultheis & Rizzo, 2001)

## Principles of Virtual Reality

- Simulated Environment
  - Virtual replication of surroundings
  - Allows control of environment

(Ryan, Rigby, & Przybylski, 2006)

- Immersion
  - Sense of "presence" (Ryan et al., 2006)
  - Participating and connecting with virtual environment (Yee, 2006)
  - Actions with real life consequences

(Schultheis & Rizzo, 2001)

## Video Game

- Games played on digital devices
- Arcade, personal computer, gaming consoles

(Baranowski, Buday, Thompson & Baranowski, 2008)

- Examples of video games and devices include:
  - Pac man, Oregon Trail, Super Mario Brothers
  - Nintendo, Playstation, XBOX, Sega Genesis, Game Cube

## Virtual Reality and Rehabilitation

- Rehabilitation can be difficult and demanding for the client.
- Health care professionals are challenged to find motivating, appealing, and meaningful tasks.

(Weiss, Rand, Katz & Kizony, 2004)

## Virtual Reality and Rehabilitation

- Virtual Reality as an Assessment
  - Objective measures
  - Increase consistency, reduce variance
  - Assess safety
  - Used to assess cognition

(Schultheis & Rizzo, 2001; Weiss et al., 2004; Yalon-Chamovitz & Weiss, 2007)

## Virtual Reality and Rehabilitation

- Virtual Reality as Interventions
  - "Naturalistic" Environment
  - Engaging/Motivating
  - Can manipulate environment
  - Provides control over scenarios

(Schultheis & Rizzo, 2001; Weiss et al., 2004; Yalon-Chamovitz &Weiss, 2007)

## Benefits

- Increase Energy Expenditure
- Improve Balance
- Increase Postural Control
- Increase Upper Extremity Motor Control
- Increase Visual Perceptual Skills

(Deutsch, Borbely, Filler, Huhn & Guarrera-Bowlby, 2008; Graves, Stratton, Ridgers, & Cable, 2008; Green & Bavelier, 2007; Rand, Kantz, & Weiss, 2009)

## Precautions/Contraindications

- Violence
- Obesity
- Addiction
- Epilepsy
- Injury

(Anderson et al., 2008; Gentile, 2009; Harding, Jeavons, & Edson, 1994; Nett, Collins & Sperling, 2008; Ricci & Vigevano, 1999; Vicente-Rodriguez et al., 2008)

## Video Games and Motivation

- Recreational activities
- Autonomy and competence
- Three motivational factors
  - Social Component
  - Immersion Component
  - Achievement Component

(Ryan et al., 2006;Yee, 2006)

## Video Games and Motivation

- Increase satisfaction
- Increase sense of control
- More realistic expectations
- Perceive therapy as less difficult
- Overall more enjoyable

(Brumels, Blasius, Cortright, Ourmedian, & Solberg, 2008; Crosbie, Lennon, McNeill, & McDonough, 2006; Rand et al.; Yalon-Chamovitz & Weiss, 2008)

## What is the Nintendo Wii?

- The Nintendo Wii is a new generation active video gaming console that utilizes a wireless controller allowing players to incorporate gross motor and whole body movements as well as interact in a virtual context.

## Nintendo Wii and Motivation

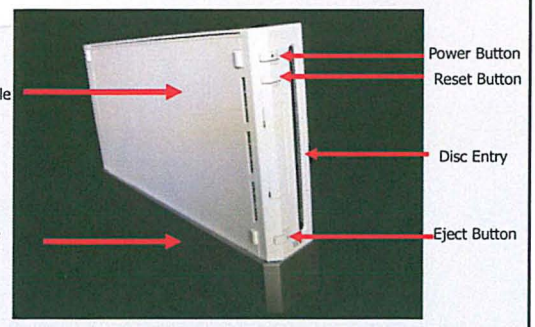
- The Nintendo Wii can be motivating and engaging for a variety of clients
- Engages clients physically and cognitively
- Allows control of environment
- Allows grading of activity
- Requires similar movements to real sports
- Encourages a social environment when played with other individuals.

(Drummond, 2008; Herz, 2009; Snider, 2008)

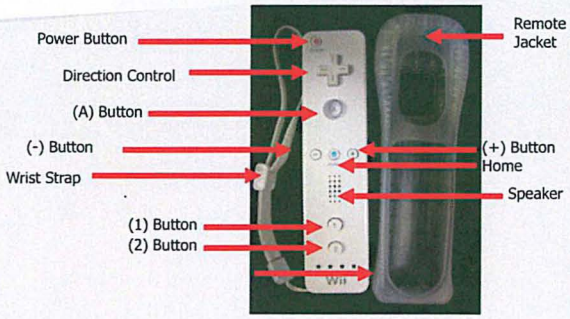
## What do you get with the Wii?

- Nintendo Wii Gaming Console
- Console Stand
- One Wii Remote
- One Wii Remote Jacket
- One Nunchuk Remote connection
- Wii Sports Game
- Sensor Bar
- AC Adapter
- TV Input/Wii AV Cable
- Two AA Batteries

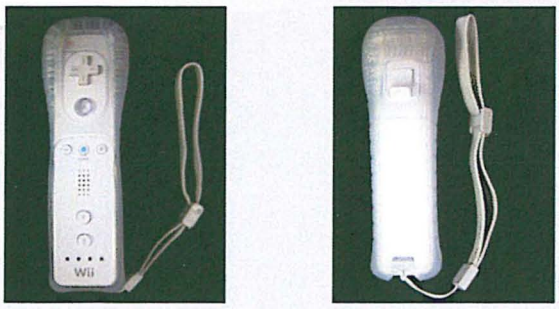
## Nintendo Wii Gaming Console



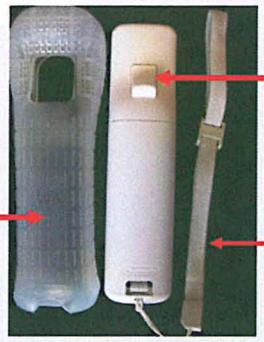

## Wii Remote



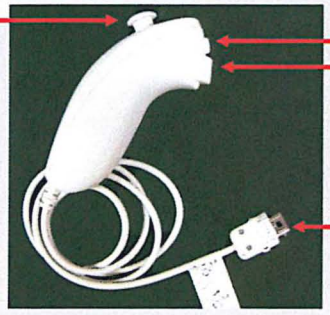

## Wii Remote with Remote Jacket



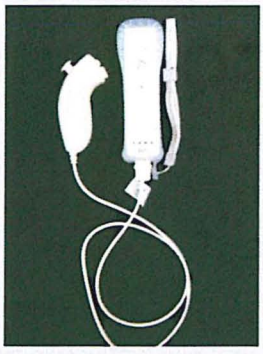
## Wii Remote



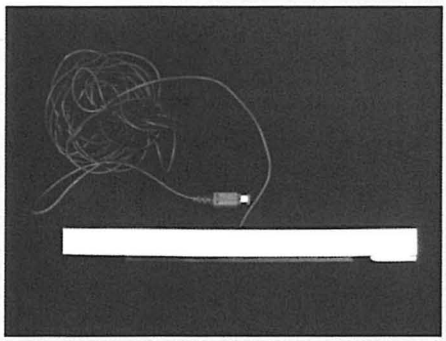

## Nunchuk Remote Connection



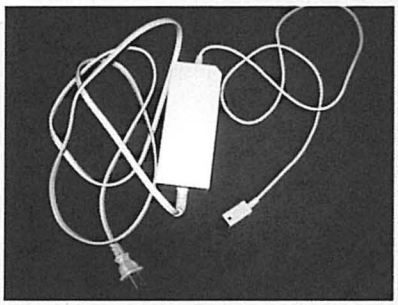

## Nunchuk Remote Control



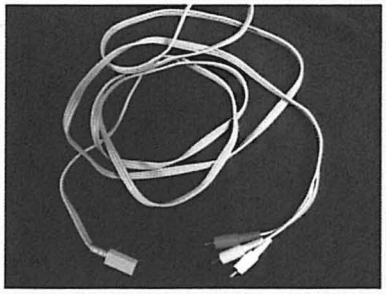
## Sensor Bar



## AC Adaptor



## TV Audio/Video Inputs

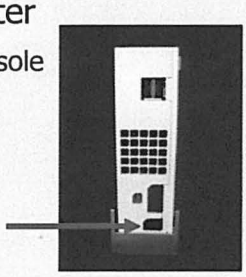


## System Set Up: Tips for Getting Started

- Double check for all components
- Horizontal vs. Vertical
- Check Television Set for RCA Inputs
- Temporary/Permanent Set up
- Allow ample space

## System Set Up: Connecting AC Adapter

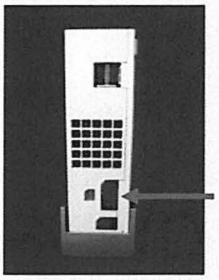
- Insert Wii AV into Console as pictured by the red arrow



- Plug opposite end into Wall Outlet

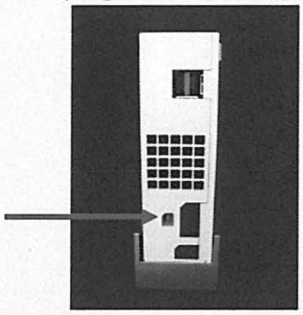
## System Set Up: Connecting Console to TV

- Connect the RCA cables to the television
  - Correspond colors of cables with colors of inputs on TV
- Connect the opposite end to the Nintendo Wii as the red arrow indicates



## System Set Up: Connecting Sensor Bar

- Insert sensor bar plug into identified area on console



## System Set Up: Connecting Sensor Bar

- Remove the protective sheet from sticky squares on the bottom the sensor
- Stick on top of television or on television stand
  - Note: the sensor bar should lay flat and should be the optimum level to pick up movements from remotes

## System Set Up: Wii Remote Set Up

- Remove Wii Remote Jacket to install batteries
- Syncing Wii Remote
  - Turn on console by pressing "power" button
  - Press and release red sync buttons
    - Located on back of Wii Console
    - Located in the battery chamber on the Wii Remote
  - NOTE: The remote that comes with your system will already by synced, use this to sync additional remotes.

## Model of Human Occupation

- Volition
- Habituation
- Performance Capacity
- Environment

(Kramer, Hinojosa, Brasic Royeen, 2003)

## Activity Analysis: A Closer Look at Wii Sports

- The Nintendo Wii Sports Package includes:
  - Tennis
  - Bowling
  - Boxing
  - Baseball
  - Golf

## Activity Analysis Wii Sports

- Equipment needed: Wii Console, TV, Wii Remote, Nunchuk controller (Boxing only)
- Equipment expenses:
  - Nintendo Wii Console $200
  - Additional Wii Remote $40
  - Additional Nunchuk $20
  - AA Batteries $5.50 Pack of 4
- Space Requirements: Will vary depending on Game
- Time Requirements: Will vary depending on Game

# Wii Sports: Tennis

- 1-4 Players
  - Players require their own remote
- Choice of one, three, or five matches in a game
- How To Play
  - Use the Wii remote to participate in a doubles tennis match
- Special Considerations:
  - Fast moving, intense game
  - Use of dominant upper extremity
  - Maximum motion

# Wii Sports: Tennis

- Required Movements: Serving, Strokes
  - How to Serve
    - Swing remote up than down
      Or
    - Press the "A" button to toss the ball upward
    - Swing to hit the ball
  - How to complete a Stroke
    - Judge which side of your body the ball is coming towards
    - Forehand Stoke: Swing on your right
    - Backhand Stroke: Swing on your left
      - Note these instructions are for a "right handed" individual. Reverse for "left handed" clients

# Wii Sports: Bowling

- 1-4 Players
  - Players can share the remote
- One game is 10 frames
- How To Play
  - Use the Wii Remote to send a bowling ball down a lane in order to knock down pins.
- Special Considerations:
  - Slower moving, less intense game
  - Minimal motion

## Wii Sports: Bowling

- Required Movements: Upward Swing, Button Release, Moving/Aiming
  - Aiming
    - Use the arrow left/right keys to
  - Bowling the ball
    - Start holding Wii Remote with arm at side
    - Bring arm up to chest while holding "B" button
    - Swing arm backward
    - Swing arm forward and release "B" button to release the ball

## Wii Sports: Boxing

- 1-2 Players
- One Match consists of three one minute rounds
- How to Play
  - Use the Wii remote and nunchuk to compete in a boxing match with another player
- Special Considerations:
  - Fast moving, intense game
  - Use of both upper extremities
  - Maximum motion

## Wii Sports: Boxing

- Required movements: Punch, Block, Shifting Positions
  - How To Punch
    - Hold Wii Remote in your dominant hand and Nunchuk controller in the other
    - Thrust arm forward one at a time in a "punching" motion
    - You can aim by punching upward (head) or downward (body)
  - How to Block
    - Hold the Wii Remote and Nunchuk in front of you to block
  - How to Dodge
    - Shift your body forward, backward, left, right to dodge opponent

## Wii Sports: Baseball

- 1-2 Players
- Game is three innings, players take turns batting and pitching
- How to Play
  - Running and out fielding is done automatically
  - Each player is responsible for batting and pitching
- Special Considerations:
  - Fast moving game
  - Use of both upper extremities
  - Moderate motion

## Wii Sports: Baseball

- Required movements: Batting and Pitching
  - How to Bat
    - Hold the Wii remote with both hands like a baseball bat
    - Swing the remote forward to hit the ball
  - How to Pitch
    - Hold the Wii remote in your dominant hand
    - Swing the remote as if you were throwing a baseball
    - While you swing hit one of the following button options
      - "A" Screwball
      - "B" Curveball
      - "A" and "B" Splitter
      - No Buttons is a Fastball

## Wii Sports: Golf

- 1-4 Players
- Choose 3-hole or 9-hole course
  - Beginner, Intermediate, Expert Levels
- How To Play
  - Swing and put through a course of your choice
  - Player with fewest strokes wins
- Special Considerations:
  - Slower moving, less intense game
  - Requires use of dominant upper extremity
  - Moderate motion

## Wii Sports: Golf

- Required Movements: Swinging, Putting
  - How to Swing
    - Position your body allowing your non dominant side to be aligned with TV set.
    - Hold the Wii Remote with both hands in front of you like a golf club
    - Slowly bring both arms back towards your dominant shoulder while holding down the "A" button"
    - Swing arms down in front of you and up to the opposite shoulder
      - Note: The harder you swing the farther the ball will travel
  - How to Put
    - Putting requires the same position and movement as the golf swing
      - Note: Swing more softly and bring the remote just past your hip

## Nintendo Wii Precautions

- Seizures
- Repetitive Motion Injuries
- Eyestrain
- Electric Shock
- Motion Sickness
- Radio Frequency Interference
- Laser Device

## Strategies for therapy

- Add weight
- Wheelchair/Standing
- Bilateral Hand Use
- Weight shifting
- Weight bearing
- Splinting, gloves, brace to aid with grip
- Direction following
- Attention span

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# Appendix C:

## Resources

- System Set-Up Guide
- Instructions for Creating a Mii Character
- Wii Sports Activity Analysis Chart
- Wii Sports Interventions Chart

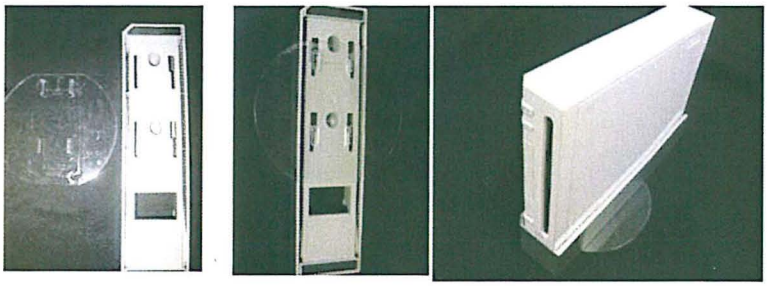
# Nintendo Wii System Set-up

**Nintendo Wii Equipment**

- Nintendo Wii Gaming Console
- Console Stand
- One Wii Remote
- One Wii Remote Jacket
- One Nunchuk Remote
- Wii Sports Game
- Sensor Bar
- AC Adapter
- TV/Wii AC Cable
- Two AA Batteries

**Nintendo System Set up**

- **Assembling the Console Stand**
  - Insert prongs on plastic plate to gray stand
  - Slide until it "clicks"

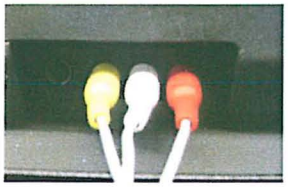


- **Connecting AC Adapter**
  - Insert Wii AV into console
  - Plug opposite end into wall outlet

AC Adapter

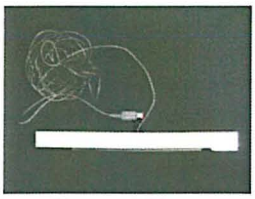
- **Connecting Console to TV**
  - Connect the RCA cables to corresponding color inputs on TV
  - Connect the opposite end to the Nintendo Wii

AV Cord



AV Cables

- **Connecting Sensor Bar**
  - Remove protective plastic, stick on top of TV
  - Insert sensor bar plug into console

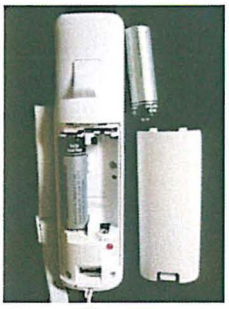

Sensor Bar


Sensor Bar

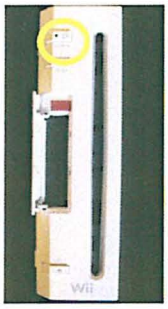
## Wii Remote Set-Up

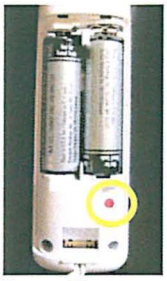
- **Battery Installation**
  - Remove Wii Remote Jacket
  - Install Batteries in compartment

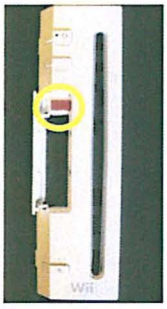

Remote and Jacket


Battery Compartment

- **Syncing Wii Remote**
  - Turn on console by pressing "power" button
  - Press and release red sync buttons (remote & console)


Power Button


Sync Button


Sync Button

  - NOTE: The remote that comes with your system will already by synced, use this to sync additional remotes.

# Creating a Mii

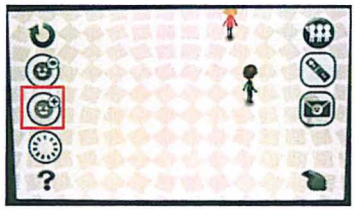
Playing the Wii for the First Time

## Mii Channel

- After turning on the Wii system, the main screen will appear.
- Use the remote to point to a specific area on the screen and press the "A" button to select the options.
- Next to the Wii Sports option is the **Mii Channel** option.
- Select the **Mii Channel** and select **Start**. This is where a Mii can be created, edited, or erased.


## Create a Mii

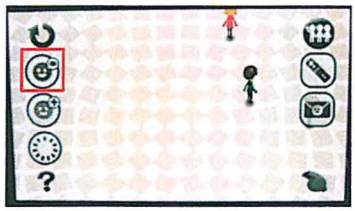
- To create a Wii, use the remote to point to the screen and options will appear. On the left side will be the option for **New Mii**, select it.
- Select a gender.
- Select **Start From Scratch** or **Choose A Look-Alike**.
- In **Start From Scratch**, every object on the Mii is selected. On **Choose A Look-Alike**, there is a list of faces to start from and changes can be made to select areas.



## General Options

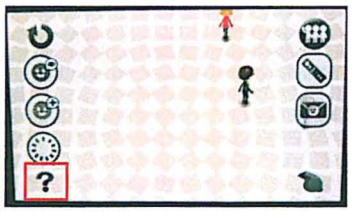
## Edit the Mii

The client can make changes to the Mii by returning to the Mii Channel and select **Edit Mii** on the left side of the screen. There will be a prompt at the bottom of the screen to use the "A" and "B" keys simultaneously to select a Mii. Once the Mii, is "grabbed", drag it to the **Edit Mii** button while still holding the "A" and "B" keys. Make the changes and **Quit**.



## Help

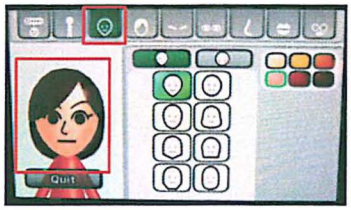
There is also a **Help** option in the lower left corner of the screen if the client has any questions or requires aid.



# Start From Scratch

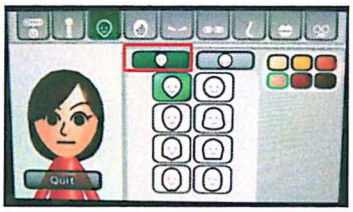
## Start From Scratch

- On the top of the screen are the options to create a Mii. The **Face Shape** option should be highlighted green.
- On the left side is the Mii that the client is creating and by selecting various options, the face will change.




## Face Shapes

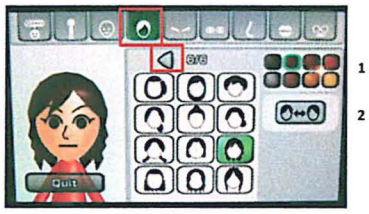
- In the middle of the screen are the face shapes. Use the "A" button to select a specific face shape.
- Next to the face shape is facial features such as rosy cheeks and freckles. Again, use the "A" button to select.
- At the top right is the skin tone selection. Use the "A" button to select the desired skin tone.




## Hair Style

- There will be 6 pages of hair to choose from, point at the arrow on the screen to go to the next page. Next to the arrow is the page number i.e. 1/6. Use the "A" button to select different hairstyles.

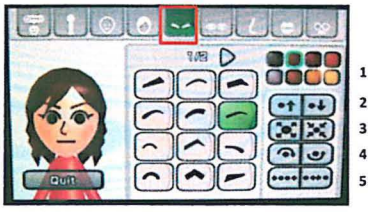
1. Choose the appropriate hair-color.
2. Change the part or the bangs to the left or right side of the Mii's face.




## Eyebrows

- There are 2 pages of eyebrows. Browse the various eyebrows and select the appropriate ones.
- To the right are more options.

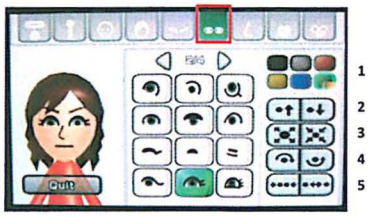
1. Select the color of the eyebrows.
2. Raise or lower the placement of the eyebrows.
3. Increase or decrease the size of the eyebrows.
4. Increase or decrease the angle of the eyebrows.
5. Increase or decrease the width between the eyebrows.




## Eyes

- There are 4 pages of eyes. Browse the various eyes and select the appropriate ones.

1. Select the color of the eyes.
2. Raise or lower the placement of the eyes.
3. Increase or decrease the size of the eyes.
4. Increase or decrease the angle of the eyes.
5. Increase or decrease the width between the eyes.



## Nose

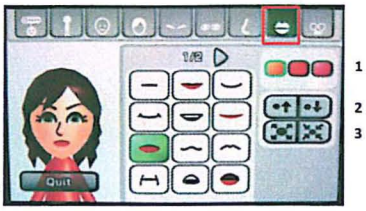
- There is 1 page of noses. Browse the various noses in the middle of the screen and select the appropriate one.

1. To the right are more options. First is the option to raise or lower the placement of the nose.
2. The last option is to increase or decrease the size of the nose.


## Lips

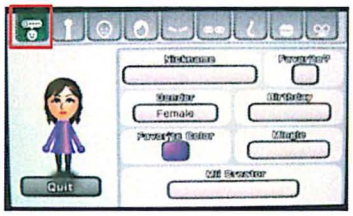
- There are 2 pages of lips. Browse the various lips in the middle of the screen and select the appropriate ones.

1. Select the color of the lips.
2. Raise or lower the placement of the lips.
3. Increase or decrease the size of the lips.




## Personalize the Mii

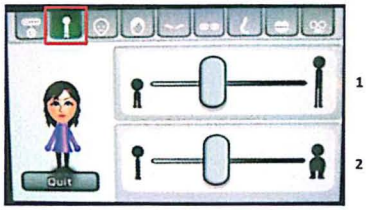
- There are 2 optional choices
- At the extreme left of the screen is where the client can choose to name the Mii by selecting the **Nickname** option.
- The client can choose a color for the Mii to wear by selecting the **Favorite Color** option.




## Body Size

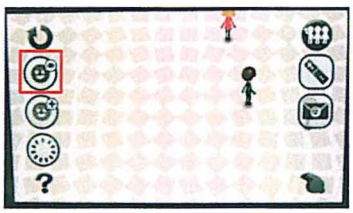
- The second optional choice is the body size of the Mii.

1. Height of the Mii. Use the "A" button to move the silver bar to the left or the right. If moved to the left, the Mii becomes shorter and if moved to the right, the Mii becomes taller.
2. Width of the Mii. Again, move the bar to the left or the right. If moved to the left, the Mii becomes narrower and if moved to the right, the Mii becomes wider.




## Complete the Mii

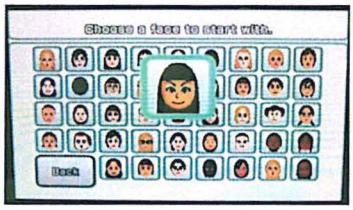
- Now the Mii is completed! Select the **Quit** button below the Mii and select **Save and Quit** to use the Mii.
- There is also the option to **Quit without Saving** the Mii in which the Mii will not be available for use with the games.
- If a nickname for the Mii was not completed, a prompt will be available at this time to name the Mii.
- If the client decides to make changes to the Mii, return to **Edit Mii**.



## Choose A Look-Alike

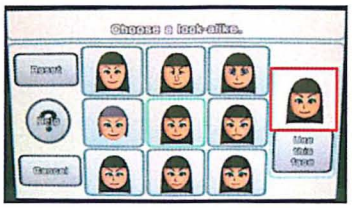
## Choose A Look-Alike

- There will be a prompt to select the Mii face closest to the one desired.
- Use the remote to point to an area on the screen and press the "A" button to select specific options.
- Now choose a face to begin with.



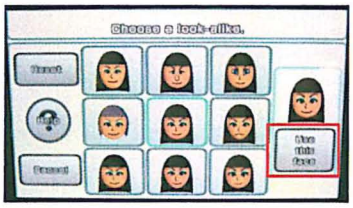

## Choose Another Face

- There will be a prompt to choose another face in order to gradually get closer to the desired face.
- Continue to select faces until the appropriate choice is made.
- The face of the Mii that is chosen will appear on the right of the screen.



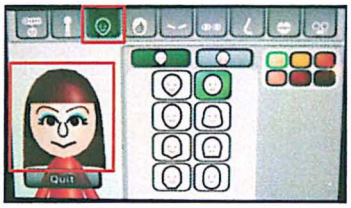

## Use This Face

To choose a face, select the **Use this Face** option at any time to make a final selection.




## Make Changes to Face

- There will be a final option to select specific facial features to change them.
- Use the options at the top of the screen to make the changes.
- The current Mii will be displayed on the left side of the screen.
- For a more detailed description of the options, refer to **Start from Scratch** section.




# Recommendations

- Another idea to consider for use of the Wii is give the client instructions to create a Mii to look exactly like he/she does. This could be a way to determine if a person can make the appropriate choices and tests cognitive skills.
- Another goal could be to show the client a picture of a celebrity to see if he/she can create a Mii to match the specific picture.

# Wii Sports Activity Analysis

An activity analysis determines if an activity can motivate and meet the needs and of a client's occupational performance as well as improve performance components. The activity analysis is utilized to determine the value and potential for interventions of an activity. Also, it allows an occupational therapist to select and plan an activity to in order to provide treatment for a client based on physical dysfunction or functional limitation (Watson & Llorens, 1997).

The following chart is an activity analysis and comparison of the five games included in the Wii Sports package. It is intended to analyze each game and discern which sensory, perceptual, neuromuscular, range of motion, motor, and cognitive performance components are challenged during participation. An occupational therapist can utilize this chart to determine which performance components are needed to participate in each game and more importantly, whether a client has the performance components to participate in the game.

The format for this activity analysis chart was chosen because it provides the wide array of components that are involved when making the decision to implement the Nintendo Wii as an intervention. All of these components are relevant for the treatment of clients by an occupational therapist. This information is pertinent for occupational therapists to keep in mind when considering if this specific intervention is appropriate for a client with specific deficits and limitations. It is also compatible due to the fact that the development of this activity analysis was grounded in the theory of Model of Human Occupation which is also the theory selected to guide this project of implementing the use of the Nintendo Wii into occupational therapy treatment.

Level of Challenge Presented by Performance Component:

- Min (Minimal): Performance component is challenged or involved minimally.
- Mod (Moderate): Performance component is challenged, but not to a great degree.
- Max (Maximal): Performance component is challenged or involved to a great degree.
- N/A (Not Applicable): Performance component is not challenged.

| | Tennis | Baseball | Bowling | Golf | Boxing | Comments |
|---|---|---|---|---|---|---|
| **A. Sensorimotor Component**<br>**1. Sensory**<br>**a. Awareness & Processing** | | | | | | |
| *Tactile* | Max | Max | Max | Max | Max | 5 out of 5 games require the client to continuously hold the remote and press buttons while playing. Also, it is important to note that the remote does vibrate at times. |
| *Proprioception* | Max | Max | Max | Max | Max | 5 out of 5 games require various movements of the body. The client must be aware of the location of body parts, especially the upper extremities because they are the most involved in activities such as throwing and swinging various objects. |
| *Vestibular* | Mod | Mod | Min | Max | Max | 2 out of 5 games require consistent use of different head positions and movement and some require more use of vision instead. |
| *Visual* | Max | Max | Max | Max | Max | 5 out of 5 games require clients to interpret stimuli from their eyes. |
| *Auditory* | Mod | Mod | Min | Min | Min | 0 out of 5 games require use of this component consistently. Clients can use sound to judge actions in some games. It is important to note that there are sounds in all games but some are more useful than others. |
| **b. Perceptual Skills** | | | | | | |
| *Right-Left Discrimination* | Max | Mod | Mod | Max | Max | 3 out of 5 games require a greater emphasis on differentiating objects on the right or the left side. While the remaining games require less of a challenge on this component. |
| | | | | | | |

| | Tennis | Baseball | Bowling | Golf | Boxing | Comments |
|---|---|---|---|---|---|---|
| *Position in Space* | Max | Max | Max | Max | Max | 5 out of 5 games require the client to determine the location various objects and figures in relationship to the client's Mii. |
| *Depth Perception* | Max | Mod | Max | Max | Max | 5 out of 5 games require the client to determine the distance between objects and the Mii. Baseball requires less due to the pitching portion of the game in which the client simulates throwing the ball, but doesn't require aim. |
| *Spatial Relations* | Max | Mod | Max | Max | Max | 4 out of 5 games require the client to determine the position of the objects relative to each other. |
| **2. Neuromuscular** | | | | | | |
| *Strength* | Mod | Mod | Min | Mod | Mod | 5 out of 5 games do not require a large degree of muscle power. Clients do have to move upper extremities against gravity. In a majority of the games, the client has the option to use more force to throw or swing various objects. |
| *Endurance* | Max | Mod | Min | Min | Max | 2 out of 5 games require constant motion and exertion while there is more time for breaks in the other games. It is important to note that the client can "pause" a game at any time if they become fatigued or short of breath. |
| *Postural Control & Alignment* | Max | Max | Max | Max | Max | 5 out of 5 games require the client to adjust the body and extremities throughout playing. |
| *Balance* | Max | Max | Max | Max | Max | 5 out of 5 games require the client to maintain stability and equilibrium throughout playing. There is a great deal of movement and clients must take care to avoid any falls. |
| *Energy Expenditure* | Max | Mod | Min | Min | Max | 2 out 5 of games require the client to use greater energy consistently and are overall at a faster pace while the other games incorporate more breaks and are slower paced. |
| | | | | | | |

| | Tennis | Baseball | Bowling | Golf | Boxing | Comments |
|---|---|---|---|---|---|---|
| **3. Range of Motion** | | | | | | |
| *Shoulder Flexion* | Max | Max | Max | Max | Max | 5 out of 5 games use this motion to bring the upper extremity forward consistently (swinging and throwing). |
| *Shoulder Extension* | Max | Min | Max | N/A | N/A | 2 out of 5 games use this motion to move the upper extremity backward consistently. |
| *Shoulder Abduction* | Max | Min | N/A | Max | Max | 3 out of 5 games use this motion to move the upper extremity away from the body consistently. |
| *Shoulder Adduction* | Max | N/A | N/A | Max | Min | 2 out of 5 games use this motion to bring the upper extremity toward the body consistently. |
| *Shoulder Horizontal Abduction* | Max | Max | N/A | N/A | Max | 3 out of 5 games use this motion to bring the upper extremity over the chest and toward the midline consistently. |
| *Shoulder Horizontal Adduction* | Max | Max | N/A | N/A | Max | 3 out of 5 games use this motion to move the upper extremity away from the midline consistently. |
| *Shoulder Internal Rotation* | Max | Max | N/A | Max | Min | 3 out of 5 games use this motion to bring the upper extremity to the stomach consistently. |
| *Shoulder External Rotation* | Max | Max | N/A | Max | Min | 3 out of 5 games use this motion to move the upper extremity away from the stomach consistently. |
| *Elbow Flexion* | Max | Max | Max | Max | Max | 5 out of 5 games use this motion to bend the elbow consistently. |
| *Elbow Extension* | Min | Mod | Max | Max | Max | 3 out of 5 games use this motion to straighten the elbow consistently. |
| *Pronation* | Max | Mod | N/A | N/A | Max | 2 out of 5 games use this motion to turn the palm down consistently. |
| *Supination* | Mod | N/A | Max | N/A | Min | 1 out of 5 games use this motion to turn the palm up consistently. |
| *Wrist Flexion* | Max | Max | Max | Mod | Min | 3 out of 5 games use this motion to bend the wrist consistently. |
| *Wrist Extension* | Max | Mod | Max | Mod | N/A | 2 out of 5 games use this motion to straighten the wrist consistently. |

| | Tennis | Baseball | Bowling | Golf | Boxing | Comments |
|---|---|---|---|---|---|---|
| *Finger Flexion* | Max | Max | Max | Max | Max | 5 out of 5 games use this motion to bend the fingers consistently. It is important to note that the client must hold on to the remote at all times. |
| *Finger Extension* | N/A | N/A | N/A | N/A | N/A | 0 out of 5 games use this motion to straighten the fingers consistently. This illustrates the previous point that the client must grasp the remote at all times while playing. |
| *Trunk Flexion* | N/A | Mod | N/A | Max | N/A | 1 out of 5 games use this motion to bend the trunk consistently. |
| *Trunk Extension* | Max | Mod | Max | Min | Max | 3 out of 5 games use this motion to straighten the trunk consistently. |
| *Trunk Rotation* | Max | Max | N/A | Max | Mod | 2 out of 5 games use this motion to turn the trunk left or right consistently. |
| **4. Motor** | | | | | | |
| *Gross Coordination* | Max | Max | Max | Max | Max | 5 out of 5 games require a great amount of use of large muscle groups for controlled and goal-directed movements, primarily of the upper extremities. |
| *Fine Coordination/Dexterity* | Min | Min | Min | Min | Min | 5 out of 5 games require minimal use of small muscle groups. |
| *Crossing Midline* | Max | Max | Max | Max | Max | 5 out of 5 games require the client to move the whole body, upper extremity, or eyes across the midsagittal plane of the body. |
| *Laterality* | Max | Mod | Max | Mod | Mod | 2 out of 5 games require consistency in the use of a preferred upper extremity but all games do require the client to choose a dominant hand at the least. |
| *Bilateral Integration* | N/A | Mod | N/A | Max | Max | 2 out of 5 games require the coordination of both upper extremities while playing. One game requires less of a challenge and the last two games do not require this component at all. |
| | | | | | | |

| | Tennis | Baseball | Bowling | Golf | Boxing | Comments |
|---|---|---|---|---|---|---|
| *Visual-Motor Integration* | Max | Max | Max | Max | Max | 5 out of 5 games require the coordination of the interaction on information between the eyes and movement of the upper extremities. |
| *Grasp* | Max | Max | Max | Max | Max | 5 out of 5 games require the client to hold on to the remote and maintain this hold throughout playing the game. |
| *Praxis* | Max | Mod | Mod | Max | Max | 3 out of 5 games require the client to plan a new action in response to a change in the environment of the game. |
| **B. Cognitive Integration & Cognitive Components** | | | | | | |
| *Level of Arousal* | Max | Max | Mod | Mod | Max | 3 out of 5 games require consistent alertness and responsiveness to stimuli. The other 2 games require less of a challenge due to the breaks that occur automatically. The game does not move on until the client chooses to do so. |
| *Recognition* | Max | Max | Max | Max | Max | 5 out of 5 games require the identification of familiar objects and other previously presented materials. It is important for the client to have a general awareness of the sport being played. |
| *Attention Span* | Max | Max | Mod | Max | Max | 4 out of 5 games require focus on a task over time. One game requires less of a challenge due to the fact that it is a short game and has automatic breaks between throws. |
| *Memory* | Mod | Max | Mod | Max | Mod | 2 out of 5 games require recalling information after periods of time. The other 3 games require less of a challenge as there are fewer rules to remember when compared to the other games. |
| *Sequencing* | Max | Max | Max | Max | Max | 5 out of 5 games require placing information, concepts, and actions in order. There is a definite succession for each game. |
| | | | | | | |

| | Tennis | Baseball | Bowling | Golf | Boxing | Comments |
|---|---|---|---|---|---|---|
| *Concept Formation* | Mod | Mod | Mod | Max | Mod | 1 out of 5 games require organization of a variety of information to form thoughts and ideas. The remaining 4 games require less of a challenge because there is more activity and not as much planning involved. |
| *Problem Solving* | Mod | Mod | Max | Max | Mod | 2 out of 5 games require recognizing a problem, defining a problem, identify alternative plans, select a plan, organize steps, implement the plan, and evaluate the outcome. The remaining 3 games require less of a challenge as there are less complex issues and steps involved. |
| *Learning* | Max | Max | Max | Max | Max | 5 out of 5 games require acquiring new concepts and behaviors. Even if a client is familiar with playing a specific sport, it is different when utilizing a remote to play simulated sports. |
| *Generalization* | Max | Max | Mod | Max | Max | 4 out of 5 games require applying previously learned concepts and behaviors to a variety of new situations. The last game requires less of a challenge because it isn't as difficult to play without previous experience. Also as client increases skills and therefore moves up in levels, the game still remains similar and doesn't increase in difficulty. |

Activity Analysis was adapted from:

Watson, D.E. & Llorens, L.A. (1997). *Task Analysis an Occupational Performance Approach*. Bethesda, MD: American Occupational Therapy Association, Inc.

Nintendo Wii Sports Suggested Interventions Chart

This chart provides suggested strategies for implementing the Nintendo Wii into intervention. Select performance skills are provided, as well as examples of traditional intervention approaches and suggested strategies for the Nintendo Wii. This chart was created to provide examples and suggestions for common deficit areas experienced in physical disabilities settings. Therapists are not limited to this chart, and can use it a guide when utilizing critical thinking skills and activity analysis to adapt and modify based on clients' needs.

Note: This chart was not meant to reflect all areas of occupational therapy practice; it was created to act as a guide. The selected functional deficits, examples of traditional interventions, and suggested Nintendo Wii approaches were selected to provide a guide and introduce therapists to integrating the Nintendo Wii into therapy sessions. It is recommended that therapists refer to this chart in the beginning stages of utilizing this treatment method, yet use their experience, clinical reasoning, and problem solving to meet the needs of individual clients.

| **Suggested Interventions Chart** | | |
|---|---|---|
| **Functional Deficit** | **Examples of Traditional Interventions** | **Suggested Nintendo Wii Intervention** |
| Strength | Isotonic exercises, isometric exercises, resistance, free weights, increased load with less repetitions | – Any Wii Sports games<br>– Add wrist weights and/or resistance to increase strength |
| Endurance | Standing with functional activity, functional mobility, consistent UE movement (i.e. arm bike) | – All Wii Sports games while standing<br>– Tennis and boxing require more endurance than bowling, baseball, and golf.<br>– To build up endurance set goal times and allow rest breaks.<br>– Note: Take proper falls prevention precautions |
| Standing Tolerance | Standing while demonstrating functional activity | – Any of the Wii Sports games in standing<br>– Bowling requires less ROM movements, and is a good starting game.<br>– Note: Take proper falls prevention precautions |

| Functional Deficits | Examples of Tradition Intervention | Suggested Nintendo Wii Intervention |
|---|---|---|
| Range of Motion (ROM) | Active range of motion, active assistive range of motion, passive range of motion, any functional activity that promotes full range of motion, use of thermal modalities, neuromuscular facilitation to aid in static stretching | – Any Wii Sports Games<br>– Bowling requires less ROM movements, and is a good starting game<br>– Tennis, golf, baseball require more ROM movements. |
| Balance | Dynamic and static balance activities | – All Wii Sports in standing<br>– To grade activity, use an uneven surface to challenge patients balance<br>– Note: Take proper falls prevention precautions |
| Functional Mobility | Transfer training, ambulation | – All Wii Sports games<br>– Utilize group settings and encourage sit to stand with taking turns.<br>– Have clients play from two different surfaces practicing mobility and transfers during game breaks. |
| Hand Eye Coordination | Activities that incorporate visual motor integration | – All Wii Sports games require hand eye coordination to integrate movements of the remote<br>– Tennis and baseball require visual motor integration by timing the swing of the remote to "hit" the ball on the screen. |
| Cognition | Sequencing | – Bowling and golf require pressing and releasing buttons in a sequence.<br>– Note: May require verbal cuing or hand over hand cues |
| Bilateral Integration | Activity integrates bilateral arm movements (i.e. arm bike, cooking, etc) | – Golf, baseball, and boxing facilitate the use of bilateral upper extremities |
| Fine Motor Coordination | Activities focusing on dexterity and smaller movements (i.e. handwriting, fastening clothes) | – Baseball, golf, and bowling require pressing and releasing of buttons. |

| Functional Deficit | Examples of Traditional Interventions | Suggested Nintendo Wii Intervention |
|---|---|---|
| Gross Motor Coordination | Ambulation, gross motor movements, balance activities | – All Wii Sports games<br>– Tennis, baseball, and boxing require maximal coordination |
| Grasp | Grasp, release, holding objects, strengthen fingers (i.e. therapuddy) | – All Wii Sports require grasping the Wii Remote.<br>– Boxing utilizes the Nunchuk controller which will address bilateral grasp. |
| Postural Stability | Trunk strengthening | – Playing Wii sports games while sitting on various surfaces (i.e. stability ball)<br>– Bowling is a good starting game. |
| Pain | Distraction and relaxation | – Any of the Wii Sports in a group setting to encourage interaction with others and distraction from pain<br>– Emphasize the leisure and gaming aspect<br>– Games other than Wii Sports may also be beneficial in this area |
| Attention | Functional Activity to sustain attention | – All Wii Sports require attention<br>– Set goals of sustaining attention throughout the game<br>– Note: If playing tennis select the 5 game matches to maximize sustained attention. |
| Memory/Direction Following | Sequencing, following written or verbal directions | – All Wii Sport games<br>– Ask client to repeat directions |

Pendleton, H.M & Schultz-Krohn, W. (2006). *Pedretti's Occupational Therapy: Practice Skills for Physical Dysfunction.* St. Louis, MO: Mosby Inc.

Radomski, M.V. & Trombly Latham, C.A. (2008). *Occupational Therapy for Physical Dysfunction.* Baltimore, MD: Lippincott Williams & Wilkins.

# Appendix D:

# Case Studies

# OT and the Wii - Case Studies

- Read the first case study and answer the questions pertaining to using the Nintendo Wii with a specific client
- Collaborate and discuss answers as a large group
- Read the second case study and answer the questions pertaining to using the Nintendo Wii with another specific client
- Break into small groups and discuss the case study
- Come back together as a large group and discuss answers

**Case Study #1 – Home Health**

Bessie is a 65-year-old African-American female with a diagnosis of chronic obstructive pulmonary disease (COPD), chronic renal failure, and depression. She requires 3 liters of oxygen via nasal canula. Bessie smoked 1 ½ packs of cigarettes a day for 35 years and still sneaks a cigarette occasionally. She was hospitalized for 2 weeks with an acute exacerbation of bronchitis. In addition, she became very depressed and despondent over her condition. She was discharged home from the hospital with home care services.

Prior to her hospitalization, Bessie had been managing her self-care independently but slowly. Her daughter, Clare, helps out with grocery shopping, laundry, and light home-making tasks (vacuuming and changing the beds). Her daily routine included watching TV and reading the newspapers. In the past, she enjoyed golfing with three friends. They always rented a couple of golf carts and rode in the carts throughout golfing.

Bessie lives at home with her husband, Charles, who had congestive heart disease and diabetes. They live on the first floor of a two-family house. Clare, her husband, and their two children live on the second floor. Clare and her husband work full-time and their children are in daycare all day. When the children are at home, they enjoy playing video games and outside they play various games and sports. Bessie is retired from her job as a preschool teacher.

Bessie has resigned herself to needing oxygen for the rest of her life, but won't go out in public because she feels that people are staring at her. She and her husband have separate bedrooms; he claims he can't sleep with the noise of the oxygen machine. Bessie and her husband do not have a close relationship. She is motivated by her daughter and grandchildren and loves to have them visit often. Her husband finds the noise from the young children more than he can stand in the apartment, and limits their visits to 30-40 minutes. Bessie wishes she could go upstairs to spend more time with them but is unable because she does not have the endurance to climb the stairs. Bessie wishes to continue living at home. In addition to occupational therapy, Bessie is being seen by nursing to manage her COPD and a home health aide 5 days a week to assist with bathing and dressing.

OT Evaluation:

Bessie has no deficits in hearing or vision, except for glasses. Her sensation is intact, and no perceptual deficits are present by observation during the evaluation. Cognition is mildly impaired for memory and judgment. She has AROM WFL, but has poor endurance, tolerating no more than 3 minutes of activity. During any activity, her oxygen saturation drops to 85% when at 2 liters, but at 3 ½ liters his oxygen saturation level remains in the low 90$^{th}$ percentile. She can transfer independently in and out of bed, and she spends her day in one chair in the living room. She has difficulty rising from the toilet and has to hold onto the towel rack across from the toilet to hoist herself up. Once standing, she has difficulties with balance and posture. She takes showers, but is so exhausted afterwards that she has to rest for an hour when she is done. She gets very fatigued with dressing as well. Throughout the ADL evaluation, Bessie does not do any pursed lip breathing. She will get her own breakfast of coffee and cereal. Her husband makes lunch, and her daughter will bring down dinner or make extra and put it in their freezer to be heated in the microwave.

Bessie is very anxious and is afraid of getting out of breath with any activity. Little things are stressful to her. She answers questions in a monotone and presents with flat affect. Bessie is cooperative with her OT evaluation, but fearful of change. Her goal is to be able to shower and dress without getting fatigued. She would like to visit her daughter's apartment and spend time with her grandchildren too.

Questions:

1. What are Bessie's abilities?

2. What motivates Bessie and what does she enjoy?

3. What were Bessie's prior habits and routines?

4. What are Bessie's deficits?

5. What Nintendo Wii game(s) would be appropriate for Bessie?

6. What are considerations for Bessie and her environment?

7. What are goals for Bessie?

**Case Study #2 – Rehabilitation Hospital**

Frank is a 68-year-old Caucasian male with a diagnosis right cerebral vascular accident (CVA) of the internal carotid artery and left neglect. In addition, he has coronary artery disease and diabetes. Two weeks ago, Frank was brought to the emergency room by his wife complaining of an unbearable headache, with slurred speech, and loss of control on his left side. He was admitted to the acute care hospital where he was stabilized. He was transferred to the rehabilitation hospital for more extensive rehabilitation.

Prior to his CVA, Frank had been a very active man. He recently retired from his job as a postal worker and is looking forward to traveling with his wife. He would also like to try new activities both indoors and outdoors.

Frank and his wife live in a ranch-style home in a suburban neighborhood. As for prior routines, he was independent in self-cares. Also, Frank has always done all of the home maintenance tasks on his home.

Frank has many friends from the post office, and he has maintained his weekly bowling or baseball night with them after their retirement. He and his wife have a strong marriage. They are planning on his return home after his discharge from the rehabilitation hospital. He will be seen by occupational therapy, physical therapy, speech therapy, and recreational therapy.

OT Evaluation:

Frank has no deficits in his hearing. Frank does have deficits in perception, with difficulty in figure-ground and spatial relations. He demonstrates right/left confusion and a profound left neglect. Cognitively, Frank shows poor attention span, insight, judgment, and safety awareness. He has difficulty maneuvering around his room and the hospital environment, constantly bumping into things on the left side. Sensation testing finds impaired sensation for light touch and sharp/dull, as well as impaired stereognosis on his affected side.

Frank has no AROM or sensory deficits in his right UE. He is right-handed. He presents with weakness in his left UE and LE, he has poor dynamic sitting and standing balance and his static standing balance is fair with good static sitting balance. His PROM in his left UE is shoulder flexion to 85°; abduction to 70°; and elbow flexion to 100°. His wrist and hand have PROM that is WNL, but has increased tone in fingers and wrist. His left UE has AROM as follows: shoulder flexion/extension: 0-50°; add/abduction: 0-45°; internal rotation: 0-5°; external rotation: 0-15°; elbow flexion/extension: 0-60°; supination: 0-15°; pronation: WNL; wrist extension: 0-10°; wrist flexion 0-45°; finger flexion/extension are weak. He is unable to release objects. Strength is not tested due to increased tone. Coordination on the left is impaired for both fine and gross motor.

He ambulates with a hemi walker and minimum assist due to his poor balance. He transfers with minimal assist and moderate verbal cueing due to poor safety awareness. Frank is amiable and likes the staff. He teases them and is good at involving humor in interactions with others. Frank's and his wife's goal is for him to return home and resume his hobbies. He looks forward to picking up his life where it was before it was disrupted by the CVA. He doesn't understand why he needs therapy but is willing to do it. Frank's wife is very supportive of these goals and will do whatever it takes to get him home to live life as before.

Questions:

1. What are Frank's abilities?

2. What motivates Frank and what does he enjoy?

3. What were Frank's prior habits and routines?

4. What are Frank's deficits?

5. What Nintendo Wii game(s) would be appropriate for Frank?

6. What are considerations for Frank and his environment?

7. What are goals for Frank?

# Sample Goals Pertaining to Case Studies

## Goals for Bessie:

**Volition –**

- Client will demonstrate increased ability to stand independently within 2 weeks, evidenced by ability to participate in activity for 8 minutes while standing.

-By discharge (d/c), client will demonstrate increased endurance, evidenced by ability to climb a set of stairs to complete a valued occupation of visiting family members.

**Habituation –**

- Client will complete daily schedule of activities in order to establish a daily routine within 2 weeks.
- Client will increase overall strength within 4 weeks to complete instrumental activities of daily living (IADL's) such as grocery shopping and laundry independently.

**Performance Capacity –**

- By d/c, client will demonstrate increased balance and posture in order to complete IADL's such as cooking meals and vacuuming independently.
- Client will demonstrate increased memory by completing activity independently within 1 month.
- Client will demonstrate increased judgment by participating and responding to an activity within 4 weeks.

## Goals for Frank:

**Volition –**

- Client will demonstrate increased standing balance in order to return home and complete ADL's such as showering with modified independence within 4 weeks.
- Client will demonstrate increased gross coordination in order to participate in leisure activities such as bowling and baseball by d/c.

**Habituation –**

- By d/c, client will demonstrate left shoulder flexion that is within functional limits (WFL) in order to complete ADL's such as personal hygiene and grooming.
- Client will demonstrate decreased left visual neglect in order to scan the environment to safely participate in IADL's such as home maintenance within 1 month.

**Performance Capacity –**

- Client will increase awareness of spatial relations in order to participate in leisure activities by d/c.
- Client will increase ability to use right-left discrimination to increase ADL's such as dressing within 4 weeks.
- Client will demonstrate increased attention span from 5 minutes to 20 minutes within 3 weeks in order to participate in leisure activities such as bowling and baseball.

**Example Answers for Case Study #1:**

1. What are Bessie's abilities?

- No deficits in hearing or vision, with the exception of glasses
- Intact sensation
- No deficits in perception
- Active range of motion is within functional limits
- Able to transfer independently

2. What motivates Bessie and what does she enjoy?

- Bowling with her friends
- Spending time with her daughter and grandchildren
- Going upstairs to her daughter's home

3. What were Bessie's prior habits and routines?

- Retired and mostly watched TV and read the newspaper
- Occasionally, played golf with friends
- Completed self-cares independently
- Required help from daughter for IADL's such as grocery shopping, laundry, and other home-making tasks (vacuuming and changing the beds)

4. What are Bessie's deficits?

- Dramatic decrease in endurance
- Mildly impaired cognition, specifically in memory and judgment
- Difficulty standing up from the toilet
- Decreased standing balance and posture
- Increased fatigue
- Depression
- Anxious and fearful of change

5. What Nintendo Wii game(s) would be appropriate for Bessie?

- At this time, Golf and Bowling would definitely be appropriate as they require minimal amount of endurance. She previously enjoyed Golf, so that could be tried first. If client is able to tolerate these games well, Baseball could be attempted as well because it requires a moderate amount of endurance. Tennis and Boxing would not be appropriate until the client has increased her endurance for maximal performance. For further motivation, she could play these games with her daughter and/or grandchildren as well.

6. What are considerations for Bessie and her environment?

- The client has a low level of endurance and fatigues extremely easily. It would be important to observe the client for signs of fatigue and continually monitor how client is feeling. It also might be necessary to check oxygen saturation.
- The client does have mild impairment in memory and judgment, so thoroughly explain directions on playing the Nintendo Wii.
- The client is anxious and fearful of change so it is important to emphasize with the client and encourage her through this process.
- Before utilizing the Nintendo Wii, ensure that there is enough space to play games and that there is a television that can be utilized. Also, talk to the client and her husband to make sure that they agree to use the Nintendo Wii in their home.
- Keep in mind that the client has depression and that the husband is not very supportive.

7. Sample Goals Incorporating Model of Human Occupation (MOHO):

**Volition –**
- Client will demonstrate increased ability to stand independently within 2 weeks, evidenced by ability to participate in activity for 8 minutes while standing.
-By discharge (d/c), client will demonstrate increased endurance, evidenced by ability to climb a set of stairs to complete a valued occupation of visiting family members.

**Habituation –**
- Client will complete daily schedule of activities in order to establish a daily routine within 2 weeks.
- Client will increase overall strength within 4 weeks to complete instrumental activities of daily living (IADL's) such as grocery shopping and laundry independently.

**Performance Capacity –**
- By d/c, client will demonstrate increased balance and posture in order to complete IADL's such as cooking meals and vacuuming independently.
- Client will demonstrate increased memory by completing activity independently within 1 month.
- Client will demonstrate increased judgment by participating and responding to an activity within 4 weeks.

**Example Answers for Case Study #2:**

1. What are Frank's abilities?

- No deficits in hearing
- Right handed with no sensory or ROM deficits
-Static standing balance is fair with good static sitting balance
- Left wrist and hand have PROM that is WNL, (but there is increased tone in fingers and wrist)
- Left UE has pronation that is WNL

2. What motivates Frank and what does he enjoy?

- Amiable with good sense of humor
- Motivated to return home
- Supportive wife
- Active lifestyle
- Spending time with friends, extremely social
- Bowling and playing baseball

3. What were Frank's prior habits and routines?

- Extremely active – indoor and outdoor activities
- Independent in self-cares and maintained his home
- Weekly sports activities with friends
- Retired and planned to travel with wife

4. What are Frank's deficits?

- Profound left neglect
- Decrease in perception, specifically figure-ground and spatial relations
- Right/left confusion and discrimination issues
- Weakness in left side
- Poor dynamic sitting and standing balance
- Decreased attention span, insight, judgment, and safety awareness
- Impaired sensation and stereognosis of left UE
- Decreased ROM and increased tone of left UE
- Impaired fine and gross coordination

5. What Nintendo Wii game(s) would be appropriate for Frank?

- All games would be appropriate for this client. Bowling could be attempted first as the client has personal experience with bowling, enjoys it, and it requires less strength. Initially, it might be necessary to play the game while sitting and work toward standing. Once Bowling is mastered standing, he could attempt Baseball as well. Other games could be utilized as well depending on that the client is working on in therapy that day.

6. What are considerations for Frank and his environment?

- The client has a wide array of deficits that must be carefully monitored. He has poor balance and safety awareness. Initially he could play games while sitting and progress to standing. There is a possibility for the client to utilize his left UE while playing games in order to increase the usage of it but this could be frustrating for him. Make sure to provide consistent verbal cues and thoroughly explain how to play the Nintendo Wii. If there is any trepidation for use of the Nintendo Wii, it may be necessary to emphasize practice bowling in a safe setting in order to bowl with his friends once discharged.

7. Sample Goals Incorporating Model of Human Occupation (MOHO):

**Volition –**
- Client will demonstrate increased standing balance in order to return home and complete ADL's such as showering with modified independence within 4 weeks.
- Client will demonstrate increased gross coordination in order to participate in leisure activities such as bowling and baseball by d/c.

**Habituation –**
- By d/c, client will demonstrate left shoulder flexion that is within functional limits (WFL) in order to complete ADL's such as personal hygiene and grooming.
- Client will demonstrate decreased left visual neglect in order to scan the environment to safely participate in IADL's such as home maintenance within 1 month.

**Performance Capacity –**
- Client will increase awareness of spatial relations in order to participate in leisure activities by d/c.
- Client will increase ability to use right-left discrimination to increase ADL's such as dressing within 4 weeks.
- Client will demonstrate increased attention span from 5 minutes to 20 minutes within 3 weeks in order to participate in leisure activities such as bowling and baseball.

Case Studies were adapted from:

Halloran, P. & Lowenstein, N. (2000). *Case Studies Through the Healthcare Continuum A Workbook for the Occupational Therapy Student.* Thorofare, NJ: SLACK Inc.

# Appendix E:

## Outcomes Measures

- In-Service Evaluation
- Follow-Up Evaluation

# In-Service Evaluation

Please complete this survey to provide the presenters with information related to you as an occupational therapy practitioner, your facility, and any changes that could be made to the in-service/resources. Thank you for your participation!

**Please circle yes or no for the following statements:**

The facility I work in currently owns a Nintendo Wii.

Yes No

I currently use the Nintendo Wii as an occupational therapy intervention.

Yes No

After this presentation, I plan to use the Nintendo Wii as an intervention with appropriate clients.

Yes No

**Please circle the appropriate number in regards to your confidence on a scale from 1-not confident to 5- very confident:**

I feel confident in the set-up of the Nintendo Wii system.

1 2 3 4 5

I feel confident in using the Nintendo Wii as an intervention.

1 2 3 4 5

I feel confident in making adaptations to best facilitate client's needs and address performance deficits and client factors.

1 2 3 4 5

**Please answer the following questions:**

What did you like about the presentation?

What did you dislike about the presentation?

Are there any additional resources that you would like to have?

Additional questions or comments?

# Follow-Up Evaluation

Please complete this survey to provide the presenters with information related to you as an occupational therapy practitioner, your facility, and any changes that could be made to the in-service/resources. Thank you for your participation!

**Please circle yes or no for the following statements:**

The facility I work in currently owns a Nintendo Wii.

Yes No

If you answered yes to previous question, did the facility own a Nintendo Wii prior to the presentation?

Yes No

I currently use the Nintendo Wii as an occupational therapy intervention.

Yes No

If you answered yes to the previous question, did you use the Nintendo Wii prior to the presentation?

Yes No

**Please answer the following questions if you currently use the Nintendo Wii as an intervention:**

How often do you use the Nintendo Wii as an intervention?

How have your clients benefitted from using this particular intervention?

Will you continue using the Nintendo Wii as an intervention?

What games do you use the most during intervention?

Has your facility bought additional games for the Nintendo Wii, if yes, what games?

Additional questions or comments?

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