

Exploring the Effectiveness of Learning American Football through Playing the Video Game “*Madden NFL*”

Seth E. Jenny & David Schary
Winthrop University, Rock Hill

This mixed-methods study investigated whether playing the video game *Madden NFL* can: (a) assist someone in learning about American football, and (b) influence someone wanting to watch or play American football. International university students with little knowledge of the sport were randomly assigned into the control group (CG) ($n = 22$) or experimental group (EG) ($n = 18$). Both groups first completed an American football questionnaire and pre-test regarding the rules, field layout, terminology, official signals, and player positions of the sport. The EG then played *Madden NFL* two times per week (30 minutes each) for four weeks. Next, both groups took the same questionnaire and post-test, with the EG also performing a one-hour focus group session. Findings indicated that playing *Madden NFL* increased total American football knowledge, specifically regarding field layout and player positions, and facilitated intentions to want to watch or play the sport in an authentic environment.

Keywords: instructional technology, sport, Exergaming, Xbox, culture, gaming, eSports

INTRODUCTION

POPULARITY OF VIDEO GAMING

Video game usage in the United States is on the rise. Retail video and computer game sales reached \$15.4 billion in 2013, with an 11.1% increase from 2009 (Siwek, 2014). According to the Entertainment Software Association (2014), 59% of Americans play video games with an average of two “gamers” per household. The average player is 31 years old with 48% of this population being female. Moreover, in one survey-based investigation, children ages 2 to 17 were reported to play video games 6 to 16 or more hours per week (Riley, 2007). In another study, results indicated that 88% of American youth between ages 8 and 18 at least occasionally play video games with an average

frequency of 3 to 4 times per week and average playing time of 16.4 hours for boys and 9.2 hours for girls per week (Gentile, 2009). Correspondingly, 83% of American 3rd to 12th grade students have at least one video game console at home, with nearly half having one in their own bedroom (Rideout, Roberts, & Foehr, 2005). Undoubtedly, video gaming has infiltrated American society.

LITERATURE REVIEW

VIDEO GAMES AND PHYSICAL ACTIVITY

Past research has demonstrated a positive correlation between obesity and screen time (including sedentary video gaming) for children under 12 years old (Vandewater, Shim, & Caplovitz, 2004) as well as a negative correlation between length and frequency of video game play with length of exercise for college-age males (Ballard, Gray, Reilly, & Noggle, 2009) – both indicating time spent playing video games replaces physical activity. This has spawned many sport and physical activity researchers to investigate energy expenditure for motion-based video games (also known as active video gaming or Exergaming). Motion-based video games employ “technology where the player utilizes physical movements to play the game” (Jenny, Hushman, & Hushman, p. 97). Example popular game systems, which utilize this technology, include the Xbox Kinect (Microsoft, Redmond, WA), Nintendo Wii (Kyoto, Japan), and PlayStation 4 (PS4) Camera (Sony Computer Entertainment, Tokyo, Japan). However, the majority of video gamers play sedentary games.

Various reports recommend limited use of sedentary video gaming for children. The Centers for Disease Control and Prevention (CDC, 2014) recommend that children “participate in 60 minutes or more of physical activity every day...and reduce sedentary screen time (e.g., television, video games, computer usage)” (p. 3). Likewise, the U.S. Department of Health and Human Services’ (2014) *Healthy People 2020* physical activity objectives recommend to “increase the proportion of children and adolescents aged 2 years through 12th grade who view television, videos, or play video games for no more than 2 hours a day” (para. 8).

MADDEN NFL

One of the most popular sedentary video games of all-time is *Madden NFL* (Electronic Arts, Redwood City, CA). *Madden NFL* is an American football video game series named after the former television commentator, head coach of the 1977 Super Bowl-winning Oakland Raiders, and Pro Football Hall of Famer John Madden. In 2013, it was reported that over 99 million copies of *Madden NFL* had been sold since its inception in 1988 and that over 235 million sessions of *Madden NFL* (version 13) had been played in 2012 alone (Robinson & McCue, 2013). According to one nationally representative survey, nearly half (49%) of boys ages 8 to 18 years have played *Madden NFL* (Rideout, Roberts, & Foehr, 2005).

Madden NFL history. *John Madden Football* was released in 1988, 1990 (second version), and has had annual versions since that time. In 1993, the name changed to *Madden NFL* after acquiring rights to use the National Football League’s (NFL) names and players in the game. Currently, the game is played on the Sony PlayStation and Microsoft Xbox game consoles. In 2005, Electronic Arts (makers of *Madden NFL*) signed a 15-year \$850 million deal with ESPN – the largest sports television network in the United States – in order to use ESPN brand name and content in its sport video games (Adams, 2005). Also, in 2013, Microsoft signed a five-year \$400 million technology and sponsorship deal with

the NFL in conjunction with its Xbox One video game console release (Fisher, Lefton, & Kaplan, 2013). *Madden NFL* continues to be the only officially licensed NFL video game.

Learning American football through playing *Madden NFL*. From its inception, John Madden endorsed and advised *Madden NFL*'s game feature development (which he continues to do with each new edition). Madden (as cited by Gaudiosi, 2013) stated from the game's origin: "I wanted it to be a coaching and teaching tool" (para. 5)... "We wanted to make the game look real... like it looks on television," (para. 12). Among *Madden NFL*'s realistic features include authentically detailed offensive and defensive play options, player statistics, official rule signal calling, and audio commentary that allows game players to hear commentary regarding the game as if it were a real television broadcast. In addition to graphics, Madden's prime advising role is to make sure the video game encompasses components of the authentic NFL American football game. Madden (as cited by Robinson, 2011) states:

It was going to be real football... And to me, that meant that you had to have 22 players. Games before that maybe had three-on-three or five-on-five, and you didn't have offensive lines or defensive lines or blitzes... I wanted it so... a coach could use [*Madden NFL*] to show his players the plays and then you could analyze the chance of success of the play. (para. 8)

Youth-league through NFL players have reported learning offensive or defensive plays or strategies through playing *Madden NFL*, with one NFL player stating that more than half of NFL players play the video game (Suellentrop, 2010). Moreover, several news articles have surfaced reporting that several international NFL players learned the rules of how to play American football through playing *Madden NFL*, including outside linebacker Bjoern Werner – the Indianapolis Colts' 2013 first-round pick from Germany (Busbee, 2013), defensive end Margus Hunt – the Cincinnati Bengals 2013 second-round pick from Estonia (Garrison, 2013), and place kicker Cairo Santos – signed by the Kansas City Chiefs in 2014 as an undrafted free agent from Brazil (Merrill, 2014). One news report surfaced citing a Cleveland-area high school football coach using *Madden NFL* to teach his players safe tackling techniques (Kyle, 2013). Accordingly, one of the marketing taglines for the newest version of *Madden NFL* is: "Be a Smarter Fan" (EA Sports, 2015).

A press release by EA Sports, a label of Electronic Arts Inc. and maker of *Madden NFL*, claimed that playing *Madden NFL* "creates more passionate and knowledgeable football fans" (EA Sports, 2009, p. 1) after an online survey was conducted comparing 9,000 *Madden NFL* video game players and non-*Madden NFL* playing football fans. This non-academic report stated that out of 25 football knowledge questions – broken into the five categories of game situations, general knowledge, history, rules, and business of sport – *Madden NFL* players scored higher in all categories and significantly higher in game situations (19%) and general knowledge (12%). In addition, it was reported that, on average, *Madden NFL* players consume 35% more football content (e.g., viewing, attending games, football-related purchasing habits) compared to those who do not play the video game – insinuating more "passion." While this study was non-experimental and the results were merely reported by the game's developer EA Sports – introducing potential bias – it certainly warrants further investigation.

EDUCATIONAL BENEFITS OF VIDEO GAMES

While several studies have examined video game use in relation to obesity and physical activity levels, other literature has investigated the cognitive benefits of playing video games for learning – many of these articles are non-experimental (e.g., Achtman, Green, & Bavelier, 2008; Annetta, 2008; Glazer, 2006; Griffiths, 2002; Wagner, 2007). Nevertheless, despite lack of knowledge on its effects, 74% of K-8th grade teachers use

digital games for instruction with over half utilizing these video games on a weekly basis (Takeuchi & Vaala, 2014).

The Society of Health and Physical Educators' (SHAPE, 2014) national physical education standard two states "the physically literate individual applies knowledge of concepts, principles, strategies and tactics related to movement and performance" (p. 12). In line with meeting this standard, researchers have claimed potential benefits of increased student motivation, understanding, and performance of sports through incorporating sport-related video games into physical education (Hayes & Silberman, 2007), which video games like *Madden NFL* may provide. However, no studies could be found experimentally investigating learning through playing video games, particularly sport video games.

STUDY PURPOSE AND SIGNIFICANCE

The prime purpose of this study was to experimentally investigate whether international college students who were not familiar with American football could learn the rules, terminology, player positions, field layout, and official signals of the sport through playing the video game *Madden NFL*. Secondly, this study investigated whether playing *Madden NFL* can influence someone wanting to watch or play American football. The questions guiding this research included: 1) Can playing the video game *Madden NFL* assist someone in learning about American football?, and 2) Can playing the video game *Madden NFL* influence someone to want to watch or play American football? This study is significant because it has the potential to shed light on whether playing sport-related video games can increase physical literacy, which may impact sport appreciation and/or motivation to be physically active (through playing American football).

METHOD

DESIGN AND PARTICIPANTS

Participants included a criterion-based convenience sample of 40 international student volunteers (21 female; average age $M = 22$ years, $SD = 2.3$) aged 18 years or older enrolled at liberal arts university located in southeastern United States. This population was desired, as international students typically know minimal about American football. Participant demographics are listed in Table 1. A mixed-methods pre/post intervention design with randomized experimental (EG: 7 female; average age $M = 23$ years, $SD = 2.6$) and control (CG: 14 female; average age $M = 21$ years, $SD = 1.5$) groups was utilized for this study. The majority of participants had prior video game experience, 73% participants had played any Microsoft X-Box gaming system (EG = 15, CG = 14) and 90% had played any Sony PlayStation gaming system (EG = 16, CG = 20). Approximately 90% of the participants had never physically played American football. Prior to the study, half of the participants did not play video games regularly, while only 7.5% ($n=3$) played more than two hours per week. Finally, 45% ($n = 10$) of the CG and 67% ($n = 10$) of the EG listed they "agree" or "strongly agree" with the statement: "*I am interested in playing video games.*" Additional participant demographic information is provided in Table 1.

Recruitment entailed informational flyers, emails, and word of mouth. One iPad mini (Apple Inc., Cupertino, CA) was used as a recruitment incentive, which was given to one participant through a covert random raffle process. "Offering material incentives can be an effective means of encouraging individuals to participate in research studies. This is a widespread practice and is...ethically justifiable" (Brown & Merritt, 2013, p. 14). Institutional review board approval and participant consent were obtained prior to data collection.

Table 1. Participant Demographics

Demographics	Control	Experimental	Total
Region			
Africa	1	2	3
Asia	5	3	8
Australia	1	2	3
Europe	9	6	15
Middle East	2	2	4
North America	2	2	4
South America	2	1	3
English Native Language	5	3	8
Type of Student			
Undergraduate	18	8	26
Graduate	4	10	14
Completed Semesters at Current Uni.			
<1	3	4	7
1	2	2	4
2	8	3	11
3	1	3	4
4	2	1	3
>4	6	5	11
Years lived in United States			
<1	4	6	10
1	4	1	5
2	1	2	3
3	6	4	10
4	2	0	2
>4	5	5	10

INSTRUMENTS

Questionnaire. Demographics such as gender, age, race, first language, type of student, and years spent within the United States were first collected via a questionnaire (see Table 1). In addition, participants were asked their prior experience and interest in playing video games, as well as, their prior experience with American football, including their perceived knowledge and intention to watch or play American football. Intention to watch or play American football questions were modelled from the “Intention to be Physically Active” instrument developed by Hein, Mүүr and Koka (2004).

American football pre/post-test. *The NFL Rules Quiz Book* (Wheelwright, 2013) and *Football Rules* (James, 2013) quiz book were used to amass 157 American football knowledge questions. Through content analysis, these questions were then coded into five categories: American football rules, terminology, field layout, official signals, and player position responsibilities. Pilot testing of these items revealed some incorrect, repeated, or unclear questions, leaving 90 potential questions – 52 rules, 9 terminology, 8-field layout, 7 official signals, and 14 player position questions. Additional pilot testing revealed the length of the instrument needed to be shortened to a more manageable timeframe (i.e., 15-20 minutes).

Seven questions from each of the five categories were selected to create the final 35-question American football pre/post-test. Final questions were selected based upon the

occurrence of the content being included in the Human Kinetics (2009) *The Sport Rules Book* as well as the most common NFL penalties called in 2014 (NFL Penalty Tracker, 2014). Moreover, an NFL scout was utilized as a content matter expert to further verify the content validity of the test. Each multiple-choice format question had three possible selections with only one correct answer.

Sample questions include: “How many points are awarded for a made field goal?” (Rules); “During a kickoff, what type of kick is used to try and keep possession of the ball?” (terminology); “How tall is the cross bar of the goal post?” (field layout); and “Which offensive player snaps the ball to the quarterback to start a typical play?” (player position). Lastly, all official signal questions involved an image of an official with the following question: “What is the referee call based on the picture below?”

EQUIPMENT

Madden NFL video game. *Madden NFL 25* (EA Sports, Burnaby, British Columbia, Canada, 2013), an American football video game based upon the National Football League (NFL), was utilized in this study. While *Madden NFL 25* is the 14th version of the game, “25” refers to the 25th year anniversary of the series. This video game does not require gross motor movements and is played with a wireless controller. Sophisticated offensive and defensive play options as well as player statistics are among the game’s realistic features. Most noteworthy, however, is that in-game voice commentary allows players to hear the game being called as if it were a real game television broadcast (i.e., critiquing game action).

Xbox One and PlayStation 4 video game consoles. Two Xbox One (Microsoft, Redmond, WA) and one PlayStation 4 (Sony Computer Entertainment, Tokyo, Japan) video game consoles were utilized to play the *Madden NFL 25* video game in this study. While the Kinect in conjunction with Xbox One will allow players to call “audibles” (i.e., change plays via voice command) at the line of scrimmage, this advanced feature was not used by these inexperienced participants.

PROCEDURES AND DATA ANALYSIS

All participants first completed the questionnaire and American football pre-test. Participants randomly assigned to the experimental group then completed eight 30 minute video gaming sessions (twice a week for four weeks) playing *Madden NFL 25* on the Xbox One or PlayStation 4 gaming console against one other participant. Each game was played with four-minute quarters, which took approximately 30 minutes to finish. To further simplify, the game difficulty settings were set at “easy” and a feature called “Ask Madden” was utilized throughout this study – a feature where the game, before each play, provides three offensive play options (or three defensive strategies if on defense) suggested for that specific game scenario. Each participant would then choose from the “Ask Madden” list. After completion of the four weeks of gaming, all participants (both the experimental and control groups) were given the same assessment (i.e., American football post-test) in order to determine any changes.

Finally, a 45-minute focus group with the experimental group only transpired using a semi-structured interview schedule. Underpinned by a constructivist perspective, focus groups allow for high-quality qualitative data in a social setting where participants are permitted to voice their opinions in the context of the views of others (Merriam, 2009). Questions centered on the video gaming experience, what they did or did not learn about American football (i.e., regarding rules, terminology, field layout, official signals, and player positions), American football culture, and future intentions to watch or play

American football. An Olympus digital voice recorder model VN-8100PC (Olympus Imaging America Inc., Center Valley, PA) was used as the main method of data collection for the focus group.

Quantitative analysis. Descriptive statistics were computed for the sample. Wilcoxon signed rank test for paired data were used to compare pre/post scores for both the experimental and control groups. The non-parametric analysis test was used because the data were ordinal, but not interval or normally distributed (i.e., it cannot be assumed the distance between each response choice is the same) (Ott & Longnecker, 2010). Related-Samples McNemar Tests were used to conduct individual comparisons for all binomial data. Independent Samples Median Tests were used to test for differences between the experimental and control groups after pre- and post-tests. Significance was set at $p < 0.05$; all analyses were conducted using IBM SPSS Statistics (IBM, 2014).

Qualitative analysis. *Atlas.ti* (Scientific Software Development, Gmbh, Germany) was used to assist in organizing and categorizing the qualitative focus group data into themes. As prescribed by Creswell (2007), the data was coded for its primary categories first (i.e., open coding) and then was re-analyzed around these core open coding phenomenon (i.e., axial coding). Finally, findings were generated through the interrelationships of the major coded categories (i.e., selective coding).

RESULTS

RESEARCH QUESTION 1

Table 2 shows the extent to which playing the video game *Madden NFL* can assist someone in learning about American football. The CG scored 58.7% on the pre-test and 59.2% on the post-test, while the EG scored 60.6% on the American football pre-test and 67.8% on the post-test. The EG's median American football test score significantly increased from pre- to post-test ($W^+ = 2.772, p < 0.05$), whereas the CG did not significantly differ from pre to post.

Regarding the sub-categories within the American football test, statistically significant improvements were limited to the EG's responses regarding field layout ($W^+ = 2.251, p < 0.05$) and player positions ($W^+ = 2.106, p < 0.05$). The CG scored 59.1% (pre-test) then 59.7% (post-test), while the EG scored 54.0% (pre-test) then 62.7% (post-test) on field layout questions. Moreover, the CG scored 54.5% (pre-test) then 57.8% (post-test), while the EG scored 54.8% (pre-test) then 66.7% (post-test) on player position questions.

For all categories in "Subjective Perceptions," both the EG and CG improved. The EG's median was significantly higher on subjective perceptions about the items: "I understand the strategies involved in American football" ($Z = 6.465, p < 0.01$) and "I can watch a game of American football and understand what is happening" ($Z = 7.785, p < 0.01$). However, the groups did not significantly differ regarding the items: "I understand the rules of American football" and "I understand the physical skills necessary in American football."

In addition, as seen in theme 1 of Table 3, qualitative findings revealed that there are several video game and environmental factors which may impact learning about American football through playing *Madden NFL* (e.g., participant competitiveness, getting to know the video game and/or controller, sport or video gaming transfer, and hearing video game commentator feedback). A discussion of this theme and its accompanying sub-themes will be provided in the discussion section.

RESEARCH QUESTION 2

The extent to which playing the video game *Madden NFL* may influence someone wanting to watch or play American football is seen in the “Interest in Football” sub-category of Table 2. While both the EG and CG median scores significantly increased pre to post for each “Interest in Football” item, the EG showed significantly more interest compared to the CG in “*I am interested in watching an American football game on TV*” ($Z = 5.683, p < 0.05$) and “*I am interested in playing American football*” ($Z = 5.683, p < 0.01$). Regarding the item “*I am interested in going to an American football game and watching it live,*” statistical significance was found within the groups pre to post, but not between the groups.

Table 2. American Football Knowledge, Perceptions, and Interest Pre/Post Results

Knowledge, Perceptions & Interest	EG	EG	W+†	CG	CG	W+†
	Pre-Test Median	Post-Test Median		Pre-test Median	Post-test Median	
Football Test Results						
Rules	5	5	1.877	4	5	1.734
Terminology	5	4	1.786	4.5	4.5	0.476
Field Layout*	4	4	2.251	4	4	0.123
Officials' Signals	4	4	0.583	4	3.5	0.725
Player Positions	4	5	2.106	3.5	5	0.476
Total Score	21.5	23.5	2.772	19.5	22	0.14
Subjective Perceptions						
Strategy	0.5	3	3.758	1	2	3.814
Understand Game	1.5	4	3.761	1	2	3.785
Rules	1	3	3.758	1	2	3.995
Physical Skills Needed	2.5	4	3.552	2	4	3.567
Interest in Football						
Watching a Game (TV)	3	4	3.663	2	3	4.041
Playing a Game	2	3.5	3.588	1	2.5	4.035
Going to a Game (live)	4	5	3.598	3	4	3.899

†bold indicated $p < 0.05$; EG = experimental group; CG = control group

*median was the same but the majority of participants increased their score

Additionally, qualitative inquiry, highlighted in theme 2 of Table 3, revealed that playing *Madden NFL* motivated almost all participants to want to watch or play American football outside the virtual environment. Moreover, playing *Madden NFL* also influenced several participants' connectedness with American culture. An analysis of this theme and sub-theme is provided in the discussion section below.

Table 3. Focus Group Theme and Sub-theme Findings

1)	Various <i>Madden NFL</i> game and environmental factors impacted participants learning of American football, including: <ul style="list-style-type: none"> • Competitiveness (i.e., winning was more important than learning) • Getting to know the video game and/or controller • Transfer (from other sport or video gaming experiences) • Hearing commentator feedback within the game
2)	Playing the video game <i>Madden NFL</i> motivated participants to want to watch or play American football. <ul style="list-style-type: none"> • Playing the video game <i>Madden NFL</i> influenced participants' connectedness with American culture.

DISCUSSION AND ANALYSIS OF THEMES

RESEARCH QUESTION 1

The first purpose of this study was to empirically investigate to what extent playing the video game *Madden NFL* can assist someone in learning about American football. The EG scored significantly higher than the CG on the overall American football pre/post-test (particularly regarding field layout and player positions) as well as their subjective perceptions of understanding both strategy and what is happening during an American football game. This parallels the EA Sports (2009) findings where *Madden NFL* video game players scored higher than non-*Madden NFL* playing football fans on a football knowledge test – significantly higher in “situations” (i.e., strategy) and “general knowledge” (i.e., possibly including player positions). In the present study, it is unknown why the EG would have scored significantly higher than the CG within the field layout test category as the game provides little of this information other than graphics of field markers. Further research is warranted here.

Complementing the quantitative results, the qualitative focus group findings revealed learning. For example, one participant explained how he learned a rule through playing *Madden NFL*:

I watched the Super Bowl before once...and I knew that after a touchdown you have to kick. And it was only one point. Then we were playing [Madden NFL] and [my opponent] got the fourth try to kick the goal and they got three points and I got so mad, “No, this game is wrong. You were supposed to get one point.” Now I understand that’s a field goal.

Likewise, another participant explained:

There is a rule that I learned, thanks to the game, is that when you intercept the ball you cannot pass it...[Also,] with a quarterback, once they cross the line of scrimmage they can’t pass the ball. I didn’t know that. That’s something I learned because I tried to do it and I got penalized.

Moreover, one participant explained how he learned an American football term through playing *Madden NFL*: “*Hail Mary. I figured out what that was. Just everyone go out in the end zone, just pretty much just hope for the best...Wait for a touchdown.*”

Qualitative findings also indicated that there were several *Madden NFL* game and environmental factors which may have impacted the participants learning of American football.

Competitiveness. Several participants noted that winning (i.e., beating their opponent in the video game) was more important than learning about American football. One participant summarized it this way:

For me, playing the game was exciting. But I think it's a little bit distracting for the rules and the terminologies and whenever [the game commentators] say something. The only thing I was interested in is getting a touchdown. I didn't care how I do it – pass, whatever. Strategy-wise, I might be understanding more, but when it comes to the rules, it still doesn't matter to me as much as winning.

Likewise, a different participant stated:

I was trying to win and I was losing every game so I was so focused on trying to win that I was like: "Just try to score something so you don't [get a] zero again. I feel like that distracted me.

It appears that a highly competitive individual may be distracted by being only interested in winning or may not care to learn about the sport (i.e., official signals, etc.) if they can still be successful in the video game.

Related to competitiveness, however, Sheehan and Katz (2010) noted that within video games, individuals “have the ability to choose their level of opposition to ensure their competitive experience is both rewarding and demanding” (p. 14) – which may facilitate intrinsic motivation to want to play the video game more. In this study, participants were randomly paired with opponents, which may have resulted in an uneven matchup. Playing the computer may have resulted in a more even competitive level, but the yearning to win may still have impacted their learning of American football just the same.

Getting to know the video game and/or controller. Another major perceived factor, which affected how much the participants learned about American football, was learning the intricacies of the game and functions of each button on the wireless controller. It appeared, at first, the participants were too focused on learning the button functions of the controller more than learning American football. For example, one participant stated, “*At the beginning I wasn't playing. I was trying to deal with the remote and choose the right buttons. And after it was easier, so I was playing to win some points.*” Several participants expressed that they wished they had a handout explaining what each button on the controller did prior to playing the game.

I think it would have been nice to get a handout...at the beginning saying like how to play the game. Not giving the rules, but just explain how to do this, how to change the player, like where the buttons are...It took me a while to figure out...strategy [and] what can we do...and how to do a kick off and stuff like that.

In the focus group it was discovered that nearly half felt they knew the button functions of the controller after two gaming sessions (i.e., one hour) with all participants feeling they knew all controller button functions after four sessions (i.e., two hours). “*At the beginning we had a struggle controlling the player. The first two weeks we're trying to figure out which [button] is best...Trying to figure out how to [play]...rather than figure out the rules.*” Thus, providing a handout detailing the controller button functions for offensive and defensive game play may facilitate learning of the sport as cognitive load would be reduced so the game player can focus more on in-game action. Moreover, as noted by Hayes and Silberman (2007), in-game tutorials or other imbedded instruction common in sport video games may also be utilized by an instructor to scaffold learning.

Transfer. Positive transfer occurs when an individual's prior experience with a skill facilitates learning a new skill while negative transfer happens when a learner's experience with a skill impedes learning of a new skill (Coker, 2013). It appeared negative transfer occurred with several participants with prior sport video gaming experiences using a different gaming system:

When I [played Madden NFL] on the Xbox it just threw me off because the [controller] shape is different. I was looking for one button, and "X" is under [the controller] on the PS4...[Someone might say,] "your best option is 'X'," so I was looking for X, but I was pressing "A" instead.

As was the case here, negative transfer occurred, as the participant was required to learn a new response (i.e., pressing buttons on the Xbox controller) which was different from a prior well-learned response (i.e., pressing buttons on a PS4 controller). It was perceived that this impacted this participant's performance and could have affected the rate at which learning occurred within the game.

Other participants claimed prior knowledge of other sports impacting their learning of American football, particularly learning the field dimensions (i.e., field layout). One participant explained: *"I compare it to soccer. Soccer is...like 110, 120 [yards]. And I feel like football is the same, but it's not as wide as a soccer field is...So that confused me."* It appeared other prior knowledge of sport rules, like rugby, might have confused participants too.

Hearing commentator feedback within the game. As previously mentioned, *Madden NFL's* revolutionary in-game voice commentary allows players to hear the game being called as if it were a real television broadcast. Several participants voiced concerns about not being able to hear the game's commentary well: *"I tried really hard to listen to what the commentators and referees said but it was sometimes hard to hear."* Participants in this study played *Madden NFL* in a student union. Thus, physical educators utilizing sport video games for instruction must consider the gaming environment to assure the audio can be heard well by the students. If multiple gaming systems are being used, wireless audio headphones could be used to increase hearing and possibly learning.

RESEARCH QUESTION 2

The second purpose of this study was to empirically investigate to what extent playing the video game *Madden NFL* may influence someone wanting to watch or play American football. Statistical significance was found within both the EG and CG pre to post on all items concerning their interest in American football. This may have resulted from the study being performed in the fall during the NFL season where mass media coverage of the sport is rampant within the United States, which may have sparked further interest within the participants. Most importantly, however, the EG scored significantly higher than the CG regarding their interest in watching American football on television and interest in playing American football, attributable to playing *Madden NFL*. Researchers surmise that the monetary cost of watching a game live may have impacted the results of some the participants' interest in attending a game.

Watch on television. Within the focus group, all but one participant noted how *Madden NFL* stimulated their interest in wanting to watch American football on television. For example,

I don't feel like I really know more about specific rules, but I understand the game in general better, so now, if it shows on TV I'm going to be willing to watch because now I understand more what's going on in general. Even if I don't know a specific rule...I know you have four tries to go for ten yards. I know that the purpose of it is to get the ball behind the goal line, and it is not something I knew before.

The one participant who stated he did not plan to watch American football on television after playing *Madden NFL* explained:

I understand [American football] a lot more than I ever did my three years here, but I still prefer soccer. So I'll watch it if my friends are watching it...but I wouldn't go out of my way to actually sit down and watch it.

Watch live. According to qualitative data, playing the video game *Madden NFL* also motivated participants to want to watch an American football game live. All but two participants in the focus group said they wanted to go and watch a game in person (if the ticket price was not a factor). For example, one participant commented: *“Now when I go to a bar [where they are] watching [American football] I know what’s going on and everything. So it’s really more enjoyable to watch the games...I want to go watch a game in real life now.”*

Play American football. Similarly, all but three participants in the focus group noted that they were now interested in playing a game of “touch” football. A participant commented: *“You had a question [about] if you’re interested in playing football. In the beginning I was like, ‘No! Not at all.’ And now it’s like...I want to see how it is...I would try if there was an option.”* Likewise, after the lead investigator asked, *“Should we set up a game sometime?”*, one participant comically responded, *“Yes! Can we get the outfits too?”*

Consequently, it appeared that *Madden NFL* motivated the majority of participants to want to play and watch American football (on television and live – in person). Hence, playing sport video games, such as *Madden NFL*, could help individuals in striving to achieve SHAPE’s (2014) national physical education standard five of valuing physical activity for, among others, enjoyment and/or social interaction. While further research is warranted, these results may support EA Sports (2009) claims that *Madden NFL* facilitates in creating a more passionate football fan. In the EA Sports survey research, *Madden NFL* game players watched nearly three times as much football and were almost 1.5 times more likely to attend at least one NFL game compared to non-*Madden NFL* playing football fans. Thus, playing *Madden NFL* may facilitate an increase in American football appreciation, the likelihood of attending an American football event, and motivations to want to play American football (leading to increased physical activity).

Increased connectedness with American culture. Lastly, it appeared that the majority of these “international” participants also felt that playing the video game *Madden NFL* influenced their feelings of connectedness with American culture. Sample participant narratives included:

Now when I go to a bar and I see people watching the football...I get excited a little bit to be honest...I went to a homecoming [American football] game in Kentucky...three or four years [ago]. After that I’ve never been interested in football. Now anytime I go to a bar, and there’s a screen and they show football, I just watch...I don’t care about the teams. I don’t know who’s winning, but I just like [watching].

Then, after being asked by the primary investigator, *“Do you think that is from the [Madden NFL] gaming experience?”* the participant responded, *“Yeah, because it got me used to it. It got me excited whenever I see people playing it.”* One participant, whose husband is American, stated:

For me, [playing Madden NFL] really got me interested in the game, because...my husband is really into American football and I’m not at all. And now I actually know what’s going on a little bit more. We went to Buffalo Wild Wings last Thursday and...there were [American football] games everywhere [on TV], and I was actually interested in watching the game. I was telling him this is what is happening and this is what is happening. I was actually happy to be able to have this connection with him on the game. Before I was like, ‘never mind; forget it.’

Another participant summarized it this way:

[Before playing Madden NFL] I went to the bar and everyone was screaming, they were...[watching the NFL] Panthers. But for me, it didn’t make sense at all...People running. People fighting each other. I was like, ‘No, that’s not for me.’...But now I

can just say whether it's a touchdown...Now if I watch a game, I would understand. I will be screaming with them, will go crazy with all the other people.

This evidence suggests that playing *Madden NFL* enabled these participants to be more social in an American football-viewing environment, common throughout the United States. Again, in line with SHAPE's (2014) national physical education standard five, sport video games may promote learning in the affective domain where participants may recognize the value of sport through social interactions. While some researchers have decried sport-video gaming as facilitating obesity, "there is little evidence to suggest that playing video games has any detrimental impact on sports participation rates, or for that matter, levels of aggression, or sociability" (Crawford & Gosling, 2009, p. 52). While video gaming can be seen as an anti-social behavior, past research has found that social interaction (the desire for individuals to be with others while playing the video games) is a common motivational dimension among sport video game players (Kim, 2006). In the current study, this yearning for social interaction in a sport setting went beyond the video gaming environment.

CONCLUSION

In this study, it was found that playing *Madden NFL* increased total American football knowledge. Specific knowledge was increased regarding the field layout and player positions. Of note, playing *Madden NFL* also significantly increased the subjective perception of understanding both American football strategy and what is happening while watching a game on television. In addition, it was revealed that playing *Madden NFL* increased participants' interest in watching American football on television and interest in playing American football. This increased interest and knowledge also appeared to influence the "international" participants' feelings of connectedness with American culture.

IMPLICATIONS

Findings indicate that playing sport video games may facilitate sport understanding and intentions to want to watch or play the sport in an authentic environment. Coaches and physical educators should consider utilizing sport video games, like *Madden NFL*, to assist in increasing affective feelings of enjoying the sport through watching it as well as potentially increasing physical activity via the video game motivating the players to physically play the sport. Practitioners and sport managers should also consider how sport video games may increase sport consumption (i.e., television viewing, event attendance behaviors, etc.) as well as increase connectedness to a foreign culture through facilitating a common understanding of a sport ingrained in that country's culture. Finally, practitioners utilizing sport video games should consider creating handouts of the controller button functions of the game to expedite the learning process to reduce cognitive load so that the students may focus on, more importantly, aspects of the sport (i.e., rules, strategy, etc.) within the game.

LIMITATIONS AND FUTURE RESEARCH

This study was limited for gaming (i.e., eight 30 minute sessions across four weeks) and the sample size ($n = 42$). Due to the sample size, the study may have been statistically underpowered, potentially resulting in a limited number of statistically significant findings. Future studies should consider more gaming time and a larger sample, which may result in dissimilar findings from this study. Moreover, future research could track and compare

whether the participants who score more points (or win more games) while playing the video game actually know more of the rules of American football compared to the participants who do not score as many points. The Motivation Scale for Sport Consumption (Trail & James, 2001), which measures motivations behind sport spectator consumption behavior, could also be utilized in a forthcoming study to track potential effects of playing sport video games.

Additionally, in this study, the participants felt it took approximately two hours (i.e., four 30 minute sessions) of gaming before they felt comfortable knowing the game button functions of the controller. Future learning through video gaming studies should consider incorporating an initial gaming training session (possibly utilizing a game's "training mode") or provide participants with a controller button information sheet, which may assist the participants in being able to focus more on in-game learning and less on learning the functions of the controller buttons. Also, a future study could compare learning American football through passively watching television versus actively playing an American football video game. Lastly, replicating this study utilizing other sport video games may also be worthwhile.

ACKNOWLEDGEMENT

The authors express sincere gratitude to Winthrop University graduate students Candice Cobb, Brian Pille, Patrick Elias, and AJ Zeilstra for their contributions toward this study.

REFERENCES

- Achtman, R. L., Green, C. S., & Bavelier, D. (2008). Video games as a tool to train visual skills. *Restorative Neurology and Neuroscience*, 26, 435-446.
- Adams, R. (2005). ESPN gets \$850 million to stay in the game. *Street & Smith's SportsBusiness Journal*, 7(37), 5.
- Annetta, L. (2008). Video games in education: Why they should be used and how they are being used. *Theory into Practice*, 47, 229-239.
- Ballard, M., Gray, M., Reilly, J., & Noggle, M. (2009). Correlates of video game screen time among males: Body mass, physical activity, and other media use. *Eating Behaviors*, 10, 161-167.
- Brown, B. & Merritt, M. (2013). A global public incentive database for human subjects research. *Ethics & Human Research*. 35(2), 14-17.
- Busbee, J. (2013, May 2). Bjoern Werner, the Colts' first-round pick, learned how to play football from Madden games. *Yahoo! Sports*. Retrieved from <http://sports.yahoo.com>
- Centers for Disease Control and Prevention (2014). *Tips for teachers: Promoting healthy eating & physical activity in the classroom*. Retrieved from http://www.cdc.gov/healthyyouth/npao/pdf/Tips_for_Teachers_TAG508.pdf
- Coker, C. A. (2013). *Motor learning and control for practitioners* (3rd ed.). Scottsdale, AZ: Holcomb Hathaway Publishers.
- Crawford, G. & Gosling, V. (2009). More than a game: Sports-themed video games and player narratives. *Sociology of Sport Journal*, 26, 50-66.
- Creswell, J. (2007). *Qualitative inquiry and research design: Choosing among five approaches* (2nd ed.). Thousand Oaks, CA: Sage.
- EA Sports. (2009, August 20). Study finds playing EA Sports Madden NFL creates more passionate & knowledgeable football fans (press release). Retrieved from <http://investor.ea.com/releasedetail.cfm?ReleaseID=404183>
- EA Sports (2015). *Madden NFL*. Retrieved from <http://www.easports.com/madden-nfl>

- Entertainment Software Association (2014). *Essential facts about the computer and video game industry: 2014 sales, demographic, and usage data*. Retrieved from http://www.theesa.com/facts/pdfs/ESA_EF_2014.pdf
- Fisher, E., Lefton, T., & Kaplan, D. (2013). Microsoft-NFL relationship 'will evolve over time'. *Street & Smith's SportsBusiness Journal*, 16(7), 4.
- Garrison, J. (2013, February 24). 2013 NFL Combine: Margus Hunt learned football from video games. *SBNation*. Retrieved from <http://www.sbnation.com>
- Gaudiosi, J. (2013, August 27). The Boom!s keep coming: A Q&A with John Madden about his video game legacy. *Sports Illustrated*. Retrieved from <http://www.si.com>
- Gentile, D. (2009). Pathological video-game use among youth ages 8 to 18. *Psychological Science*, 20(5), 594-602.
- Glazer, S. (2006). Video games: Do they have educational value? *CQ Researcher*, 16(40), 305-328.
- Griffiths, M. (2002). The educational benefits of videogames. *Education and Health*, 20(3), 47-51.
- Hayes, E. & Silberman, L. (2007). Incorporating video games into physical education. *Journal of Physical Education, Recreation & Dance*, 78(3), 18-24.
- Hein, V., Müür, M., & Koka, A. (2004). Intention to be physically active after school graduation and its relationship to three types of intrinsic motivation. *European Physical Education Review*, 10(1), 5-19.
- Human Kinetics. (2009). Football. In *The sport rules book: Essential rules, terms, and procedures for 54 sports* (3rd ed.) (pp. 111-126). Champaign, IL: Author.
- James, R. (2013). *Football rules: Football books for kids – Interactive games and Kindle quiz book edition*. Interactive Games.
- Jenny, S. E., Hushman G. F., & Hushman C. J. (2013). Pre-service teachers' perceptions of motion-based video gaming in physical education. *International Journal of Technology in Teaching and Learning*, 9(1), 96-111.
- Kim, Y. (2006). An exploration of motives in sport video gaming. *International Journal of Sports Marketing & Sponsorship*, 10, 34-46.
- Kyle, M. (2013, July 16). Cleveland coach gets Madden game to use safer tackling. *WKYC News*. Retrieved from <http://www.wkyc.com/story/news/health/2013/10/26/3266855/>
- Merriam, S. (2009). *Qualitative research: A guide to design and implementation*. San Francisco, CA: Jossey-Bass.
- Merrill, E. (2014, September 1). Cairo Santos good fit as Chiefs' new kicker. *ESPN NFL*. Retrieved from http://espn.go.com/blog/kansas-city-chiefs/post/_/id/7425/cairo-santos-good-fit-as-chiefs-new-kicker
- NFL Penalty Tracker. (2014). Penalty counts 2014. Retrieved from <http://www.nflpenalties.com/all-penalties.php?year=2014>
- Ott, R. L., & Longnecker, M. (2010). *An introduction to statistical methods and data analysis* (6th ed.). Belmont, CA: Brooks/Cole.
- Rideout, V., Roberts, D., & Foehr U. (2005). Generation M: Media in the lives of 8-18 year olds. *Kaiser Family Foundation Study*. Retrieved from <http://kaiserfamilyfoundation.files.wordpress.com/2013/01/generation-m-media-in-the-lives-of-8-18-year-olds-report.pdf>
- Riley, D. (2007). Amount of time kids spend playing video games is on the rise. *The NPD Group*. Retrieved from www.npd.com/press/releases/press_071016a.html
- Robinson, J. (2011). Madden on 'Madden'. *ESPN: The Life*. Retrieved from http://espn.go.com/espn/thelife/videogames/blog/_/name/thegamer/id/6906723/madden-madden?readmore=fullstory
- Robinson, J. & McCue, M. (2013, March 18). Zoom. *ESPN The Magazine*, 16(5), 18-21.

- Sheehan, D., & Katz, L. (2010). Using interactive fitness and exergames to develop physical literacy. *Physical & Health Education Journal*, 76(1), 12-19.
- Siwek, S. (2014). Video games in the 21st century: The 2014 report. *Entertainment Software Association*. Retrieved from http://www.theesa.com/facts/pdfs/VideoGames21stCentury_2014.pdf
- Society of Health and Physical Educators (2014). National standards & grade-level outcomes for K-12 physical education. Champaign, IL: Human Kinetics.
- Suellentrop, C. (2010, January 25). Game changers: How video games trained a generation of athletes. *Wired*. Retrieved from http://www.wired.com/2010/01/ff_gamechanger/all/1
- Takeuchi, L. & Vaala, S. (2014). Level up learning: A national survey on teaching with digital games. Retrieved from <http://www.joanganzcooneycenter.org/publication/level-up-learning-a-national-survey-on-teaching-with-digital-games/>
- Trail, G. & James, J. (2001). The motivation scale for sport consumption: Assessment of the scale's psychometric properties. *Journal of Sport Behavior*, 24(1), 108-127.
- U.S. Department of Health and Human Services (2014). *Healthy people 2020: Physical activity*. Retrieved from <https://www.healthypeople.gov/2020/topics-objectives/topic/physical-activity/objectives>
- Vandewater, E., Shim, M., & Caplovitz, A. (2004). Linking obesity and activity level with children's television and video game use. *Journal of Adolescence*, 27, 71-85.
- Wagner, M. (2007). Learning to game and gaming to learn. *Classroom Connect*, 13(8), 1-15.
- Wheelwright, W. (2013). *The NFL rules quiz book* (Kindle ed.). Bedfordshire, UK: Andrews UK Limited.