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The Effects of Esports on Sport-Confidence and Imagery in Athletes

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THE EFFECTS OF ESPORTS ON SPORT-CONFIDENCE AND IMAGERY IN ATHLETES

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ABSTRACT

With the growing popularity of esports, athletes may be able to experience potential cognitive and performance-related benefits as a result of watching others play esports. In the current study, student athletes were randomly assigned to watch a sport esport video or a control esport video and then completed measures of sport-confidence and imagery. It was predicted that participants in the sport esport video group would score higher than the control esport video group in the cognitive efficiency and resilience aspects of sport-confidence, as well as the cognitive general, motivational general-mastery, and motivational general-arousal domains of imagery. The overall results did not support these hypotheses, with the means between groups not statistically differing. Nevertheless, future directions regarding video game use and athletic performance are discussed.

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Every two years the Olympics occur, alternating between the summer and winter games. People across the world get to watch beloved sports such as swimming, gymnastics, ice skating, and snowboarding. Athletes all over the world train to represent their country at what is considered one of the most prestigious athletic events. Sport and exercise psychology as a field has grown immensely because of these games, as sport psychologists often travel with athletes and teams across nations to assist in the enhancement of performance (Weinberg & Gould, 2014). As the Olympic Games grow, new sports are included into the plethora of competitions. In the 2021 Tokyo Summer Olympic Games, for example, sports like surfing, skateboarding, rock climbing, and karate were added into the international competition.

One of the new and upcoming sports that is being considered for future Olympic Games is esports. Esports is the term for electronic sports and refers to competitive video gaming (Hamari & Sjöblom, 2017; Pedraza-Ramirez, 2020; Reitman et al., 2020; Wagner, 2006). In May through June of 2021, the International Olympic Committee held the first ever Olympic Virtual Series where athletes could compete in events such as baseball, cycling, rowing, and racing through various virtual video game platforms (Palar, 2021). The push for esports to become a part of the Olympics continues as the

Olympic Council of Asia selected esports to be a part of the Asian Games program in 2023 (Bach, 2018). Esport popularity is growing and becoming a staple in many communities worldwide, challenging the concept of a typical athlete.

Esports have the potential to affect more people than just those playing the video games. Technological advancements have made it possible for people to stream themselves playing video games and post these streams on social networking sites. Audience members from around the world can watch professional esports athletes casually play on a Friday night, or even join in the game if a player is in an open group. These direct interactions with social networking sites make the world of esports far greater than imagined (Chen & Lin, 2018). In 2020, people watched more than 100 billion hours of video game videos on YouTube (Takahashi, 2020). Streaming is becoming extremely popular and can even be a full-time job paying 17 million dollars a year for individuals who have 22 million or more subscribers (Perez et al., 2020). It was reported that 200 million people viewed video game streams daily on YouTube in 2018 (Takahashi, 2018). As esports popularity grows, the number of people interacting with and watching video game videos is expanding as well.

Uses and Gratification Framework

With more people watching esports, it is important to understand why from a psychological perspective people might watch others play video games. Sjöblom and Hamari (2017) studied video game watching using the uses and gratification theoretical framework. This theoretical perspective has been used to research media consumption and focuses on five gratification needs for consumption: cognitive, affective, personal integrative, social integrative, and tension release (Katz et al., 1973). In the context of video game streams, cognitive needs are satisfied through watching in order to acquire information, knowledge, or comprehension. Affective motivations refer to the emotional and experiential aspects of watching streams. Personal integrative needs are those that enhance a person's credibility, confidence, or status, while social integrative needs are those that enhance connections with others. Tension release corresponds with watching streams to escape from reality, relax, or pass the time. In their study, Sjöblom and Hamari (2017) found that cognitive, affective, social integrative, and tension release needs were positively related to the number of hours a participant watched video game streams. Additional research has shown that learning about video games is another key reason behind beginning to watch streams (Hamilton et al., 2014). This research is continuing to expand, focusing on the cognitive needs and learning aspects of watching others play video games.

The desire to acquire knowledge has been investigated within participants passively watching and actively playing video games (Reitman et al., 2020). Research has shown that there can be cognitive and learning benefits associated with actively playing video games such as improvements in visual perception, spatial rotation, sensorimotor skills, and memory (Dale & Green, 2017; Franceschini et al., 2021; Pallavicini et al., 2018; Pedraza-Ramirez et al., 2020; Wagner, 2006). There is even a push to integrate video games in education to create cognitive training programs for specialized groups (Andrews et al., 2010; Hayes & Silberman, 2007; Hieftje et al., 2017; Stanmore et al., 2017). Although research has established the benefits of actively playing video games, more research is needed to better understand the potential benefits of passively watching these games.

Social Cognitive Theory

Learning from others has a long history within the field of psychology. Bandura's social cognitive theory is the most commonly used theoretical approach when studying observational learning (Hars & Calmels, 2007; Horn et al., 2002). This theory describes how people can learn behaviors through observations. Bandura (1986) stated that observational learning is composed of four sub-processes: attention, retention, ability, and motivation. Attention refers to the information a person deems relevant from an observation. This relies on characteristics of the observer, such as capabilities, arousal, and expectations, as well as characteristics of the modeled behavior, such as complexity, saliency, and affective valence. Retention refers to the observer's ability to process information deemed relevant. This relies on encoding the modeled behavior in ways that can be used later. Ability is simply the observer's ability to translate what was encoded into actions or behaviors. The last sub-process is the motivational aspect of observational learning and refers to how motivated an observer is to perform the modeled behavior.

Within this model, Bandura (1986) argued that observing the behaviors in person is not required to replicate them; watching a model would also be sufficient. This has led researchers to study how performance can be affected using videos. For example, creativity has been found to increase in participants that watched a video of others engaging in creative tasks (Groenendijk et al., 2013a; Groenendijk et al., 2013b). Mathematical ability was found to increase by watching a video of math problems being solved, but depended on the self-efficacy of the observer, which also increased by watching the videos (Schunk & Hanson, 1985). Not only are videos a viable option to increase cognitive performance, but to increase motor performance as well. Studies have looked at how watching videos of others performing a motor task increases performance of that task (D'Innocenzo et al., 2016; Farrow & Abernethy, 2002; Mattar & Gribble, 2005).

Researchers suggest that the ability to enhance cognitive and motor performance from watching videos can be attributed to an action observation network (AON) in the brain (Chen et al., 2020; Cross et al., 2009; Grèzes & Decety, 2001; Mattar & Gribble, 2005). This network contains neurons that interact both when actively performing and passively watching a given task (di Pellegrino et al., 1992; Gallese et al., 1996). These neurons are called mirror neurons and create the mirror mechanism that has been found to be a basic principle of brain functioning (Rizzolatti et al., 1996; Rizzolatti & Sinigaglia, 2016). When an individual watches another person perform an action, the brain activates in the same way it would if they were the one performing the action.

The AON is an important aspect of learning throughout all stages of life, as it helps make connections within the brain for actions in the future. Although replicating actions is one purpose of the AON, understanding them is another. These neural connections have been found to relate to emotions, vitality forms, and non-verbal communication (Hari & Kujala, 2009; Rizzolatti & Sinigaglia, 2016). Chartrand and Bargh (1999) studied that idea that a person is more likely to engage in an action after they have perceived someone else do it. Preemptively providing individuals with videos of proper strategies and techniques before engaging in a specific task might provide a blueprint for better performing that task in the future. These aspects of the AON are useful in the context of learning or modifying the cognitive and motor performance aspects of certain skills. In support of social cognitive theory, these functions of the brain show that there is a natural tendency to learn from others through observation. Social cognitive theory and the mirror mechanism provide strong theoretical frameworks for studying video use and observational learning.

Sport-Confidence

Observational learning is used to increase performance across many different fields. One field that uses observational learning to enhance performance, specifically with videos, is sport psychology. Sport psychologists understand that watching film affects many different aspects of performance (Chen et al., 2020; D'Innocenzo et al., 2016; Farrow & Abernethy, 2002; Horn, 2008; Weinberg & Gould, 2014). One of those aspects of performance is sport-confidence, or a person's belief they can accomplish a desired task in their sport (Vealey & Chase, 2008). Sport-confidence is the sport and exercise psychology aspect of self-efficacy, which is a theory by Bandura on one's ability to perform a task at hand (Bandura, 1977; Bandura et al., 1999; Horn, 2008).

Within Bandura's framework, there are six principal sources of information that affect one's self-efficacy, which can also be applied to sport-confidence: performance accomplishments, vicarious experiences, verbal persuasion, imaginal experiences, physiological states, and emotional states (Weinberg & Gould, 2014). Performance accomplishments are the successes or failures that an athlete experiences. This source of information is probably the most dependable foundation for sport-confidence due to the direct relationship with mastery experiences (Feltz et al., 2008). Vicarious experiences are demonstrations or models that athletes use to assess their own capabilities, which do not need to be witnessed first-hand. Consistent with social cognitive theory, athletes often use observing others to assess their own abilities and decide how confident they should be (McCullagh et al., 1989). Verbal persuasion refers to encouragement from others or self about performance, enjoyment, effort, and responses within sport (Weinberg et al., 1979). Although coaches and teammates play a big role in verbal persuasion, self-talk has also been found to increase feelings of sport-confidence (Hatzigeorgiadis et al., 2014). Imaginal experiences involve visualizing self or others succeeding or not succeeding in future situations. Imagery can be a useful tool for improving confidence, motivation, concentration, emotions, skills, and strategies in performance (Weinberg & Gould, 2014).

Physiological states are how arousal and anxiety can affect the body, and how the perception of bodily responses can affect sport-confidence. Fast heartbeats can either lower sport-confidence due to an athlete fearing they cannot perform a skill or enhance it due to perceiving their responses as signs they are ready for competition (Hauck et al., 2008). Finally, emotional states are feelings of happiness, exhilaration, sadness, depression, or anxiety. An athlete's mood can influence how much they believe in themselves to perform the task at hand (Martin, 2002). These sources of information work together to create an athlete's current level of sport-confidence, which can fluctuate from time to time (Horn, 2008).

To categorize these factors and assess confidence in sport, Vealey and Knight (2002) created three main types of performance-specific sport-confidence. The first is sport-confidence physical skills and training (SC-PST). This represents an athlete's belief that they have the necessary physical skills and training to succeed. The second is sport-confidence cognitive efficiency (SC-CE). SC-CE refers to an athlete's judgment in their ability to make critical decisions, maintain mental focus, and use strategy in competition. Third is sport-confidence resilience (SC-R), which the researchers hypothesize may be the most important type of confidence for athletes (Vealey & Knight, 2002). SC-R focuses on an athlete's confidence in their ability to regain focus after errors, bounce back, overcome doubts, and manage nervousness. These performance-specific categories of sport-confidence provide an effective way to view athletes' confidence levels. As their sport-confidence increases, performance increases, which in turn increases their sport-confidence more, creating a reciprocal cycle that relates significantly to sport performance (Moritz et al., 2000).

With regards to video use and sport-confidence, more research is needed to enhance the literature. A study by Law and colleagues (2018) found that videos can affect psychological responses such as increasing motivation and confidence while decreasing anxiety. It is understood that athletes use observational learning videos regularly across many sports (O'Donoghue, 2006). Outside of sport, the idea that self-efficacy can be improved by watching videos has been demonstrated across various disciplines. In nursing, online video clips have been used to enhance self-efficacy towards dealing with difficult and delicate patient groups (McConville & Lane, 2006). Self-efficacy and performance on mastering a computer software program increased more in groups that watched a behavioral modeling video than those in a tutorial training (Gist et al., 1989). Within athletic training students, using video feedback was found to significantly increase self-efficacy and performance in psychomotor competency skills (Bobo & Andrews, 2010; Bobo et al., 2012). The relationship between video use and self-efficacy supports the idea that athletes can use observational videos to improve performance.

Video games have also been used to study self-efficacy improvement. Street and colleagues (2013) discussed the importance of implementing video games as a means of promoting healthy behaviors. The use of exercise video games, or exergames, is increasing in the field of education. Exergames have been found to provide mastery experiences and social persuasion to students, leading to better self-efficacy for sport or physical activities and increasing the likelihood of future involvement in sport or physical activities (Krause & Benavidez, 2014). In children, engaging in exercise games provided positive changes in self-efficacy for those in an overweight group, showing that these games can increase physical activity in a group that does not get much exercise (Dos Santos et al., 2016; Gao, 2017). Exergames have even been used to teach undergraduate sport psychology courses and have been effective at increasing efficacy, enjoyment, attention, and critical analysis in class (Manley & Whitaker, 2011). Although active role-playing in video games has been found to influence self-efficacy more than passive observation, passive observation still increases self-efficacy (Peng, 2008). This idea of combining observational learning and video games through watching others play could be a new way for athletes to enhance sport-confidence.

Imagery

Another aspect of performance in athletes that could be increased by observational learning is imagery use. Briefly discussed earlier, imagery extends beyond being a source of information for self-efficacy. Imagery is defined as quasi-sensory and quasi-perceptual experiences that are consciously produced without the actual stimulus being present (Richardson, 1969). Imagery has been studied widely within psychology, with most of the research focusing on imagery and movement (Holmes & Calmels, 2008). Paivio (1985) created a theoretical framework that established two main functions of imagery use: cognitive and motivational. Within the cognitive and motivational functions, he further separated them into general and specific categories: cognitive specific (I-CS), cognitive general (I-CG), motivational specific (I-MS), and motivational general (I-MG). From this framework, Hall and colleagues (1998) further expanded the I-MG category into two categories, motivational general-mastery (I-MGM) and motivational general-arousal (I-MGA). I-CS refers to the technical mechanics of performing a specific task, such as throwing a baseball. I-CG refers to the strategies and concepts used during performance, such as running a play in basketball. I-MS refers to goal-oriented responses and emotions, such as the feeling of winning a medal. I-MGM refers to mental toughness or overcoming challenging situations, such as confidence after missing a field goal. I-MGA refers to physiological and psychological states, such as achieving relaxation and control. These five functions of imagery work together to allow an athlete to imagine all aspects of performance.

The relationship between imagery and observational learning has often been misconstrued (Ste-Marie et al., 2012). Although the two are very similar in nature, they are distinct mechanisms, with each playing a different role in performance (Holmes & Calmels, 2008). A comparative meta-analysis by Hardwick and colleagues (2018) found that motor imagery and action observation recruited similar premotor-parietal cortical networks in the brain, while motor imagery and movement execution recruited similar subcortical networks. This shows that imagery is closely related to, but ultimately different from, observational learning and movement. Imagery has also been shown to relate to self-efficacy (Martin et al., 1999). For athletes, imagery use and self-confidence are positively correlated (Abma et al., 2002; Callow & Hardy. 2001; Mills et al., 2000; Vadoa et al., 1997). Athletes with higher skill levels also engage in imagery more often, although imagery benefits athletes of all skill levels (Weinberg & Gould, 2014). The relationships among imagery, observational learning, and sport-confidence require additional research to fully understand the mechanisms behind them.

Imagery training programs have been created to assist in imagery use and enhance imagery functions. Within these training programs the method of assisting athletes is individualized based on the person. Video use has been found to significantly affect imagery within these training programs. Smith and Holmes (2004) found that the way imagery interventions are delivered can affect the effectiveness they have on performance, such that implementing video or audio imagery instructions benefited golfers more when putting than written imagery instructions. Wakefield and Smith (2011) found that the use of video-assisted imagery significantly improved strength performance. These studies are influential due to most imagery research focusing on using scripts to assist with imagery when videos have also been found to be a viable option, although imagery intervention programs should be created with the individual in mind (Holmes & Collins, 2001). The use of videos in enhancing imagery is similar to that of observational learning but should be studied further and distinctly.

There is little existing literature connecting video games and imagery use in the field of sport psychology. Although the direct relationship of imagery has not been studied, researchers have found video games can increase spatial visualization (Dorval & Pepin, 1986; Lowery & Knirk, 1982; Zammitto, 2008). In the medical field, the use of video games has been found to facilitate successful rehabilitation (Lohse et al., 2013). Video game use in rehabilitation patients has even been found to produce similar results to conventional therapy (Bonnechère et al., 2016). The purported relationship between video games and imagery use within sport is plausible given the surrounding research. With imagery being closely related to observational learning and self-efficacy, and video games relating positively to both, it seems plausible that video games could relate to certain imagery functions in sport.

The Current Study

As esport popularity grows, more people are watching others play video games through streams. Although the literature on these topics is growing, there remains a need to better understand how watching video games can influence sport-confidence and imagery use in sport. Within training programs, using videos as a means for observational learning could positively affect sport-confidence and imagery. Since traditional athletes are surrounded by sports, physically and virtually, using esports to improve performance through these domains seemed like a plausible next step.

Thus, the current study aimed to investigate the relationship among watching video games, sport-confidence, and imagery use in athletes. Participants were randomly assigned to watch an esport video of their sport or a control esport video and then completed measures of sport-confidence and imagery use. Watching a clip of the athletes' respective sport is recommended due to findings that an imagery training program is more beneficial when tailored to their specific sport (Holmes & Collins, 2001). The first prediction was that athletes in the sport game group would score higher in sport-confidence than those watching the control video, specifically in SC-CE and SC-R, while SC-PST scores would not differ. The second prediction was that athletes in the sport game group would score higher in imagery use than those watching the control video, specifically in I-CG, I-MGM, and I-MGA, with I-CS and I-MS scores not differing. SC-PST, I-CS, or I-MS scores were not predicted to differ between the sport esport group and the control esport group due to the non-physical and virtual aspects of the clips. These results would imply that watching others play video games could help improve specific aspects of self-efficacy and imagery use in athletes.

METHOD

Participants

Participants were students from Stephen F. Austin State University (SFA) who signed up for the study online through the research sign-up system SONA or the volunteer application Helper Helper. The data collection platform Qualtrics was used to distribute the survey and collect the data. Due to the focus of the study, only football student athletes were allowed to participate. This was done to reduce variability within the sample population, as different sports may engage in different levels of sport-confidence and imagery use. To be considered a football athlete, the participant was required to be involved in the officially sanctioned football collegiate sport as determined by the National Collegiate Athletic Association (NCAA). The SFA athletic department and coaching staff assisted in recruitment procedures for the study. These recruitment procedures consisted of announcements at team meetings, quick response (QR) codes at the end of training sessions, emails and texts from coaches, and notifications within Helper Helper. Helper Helper is a volunteer tracking app and management platform that is used to record efforts made by coaches, staff, and students in making an impact on the local community (SFA, 2021). To encourage participation, athletes were provided one hour of community service credit through Helper Helper as compensation.

Although 93 athletes began the study, only 73 continued to completion and were used in analyses (*N* = 73). There was a similar, but non-equivalent, number of participants in each group of the independent variable, with 36 in the sport esport video group and 37 in the control esport video group. All participants were at least 18 years of age (*M* = 20.78, *SD* = 4.42). Of the 73 total participants, one identified as American Indian/Alaska Native (1.4%), 39 as Black or African American (53.4%), one as Hispanic (1.4%), one as West African (1.4%), 22 as White (30.1%), three as more than one race (4.1%), one as not listed/unknown (1.4%), and five did not respond (6.8%). Regarding their classification in football, 27 players were considered first years (37%), 12 second years (16.4%), 14 third years (19.2%), seven fourth years (9.6%), eight fifth years (11%), and five did not respond (6.8%). The average number of years athletes had been playing football throughout their life was 9.75 (*SD* = 5.09), with the average number of hours athletes played video games in the previous week being 3.60 (*SD* = 4.91).

Materials

Athletes were randomly assigned to one of two conditions, either the specific esport video group or the control esport video group, at the beginning of the Qualtrics survey. The specific esport group watched a five-minute clip of the video game Madden 21, which is an American football video game where players control professional football teams in a game against each other. The control esport group watched a five-minute clip of the video game Super Smash Bros. Ultimate, which is a crossover fighting game where players control fictional characters in a battle to decrease each other's health. Each athlete was instructed to focus on their specific player role, or one character within the clip, and that there would be some questions after the video. Both clips were recordings of the computer playing against itself to reduce the possible factor of human interference. The questions provided after the videos were called attention checks and asked about the content and result of the video watched (see Appendix A). For the Madden 21 video, participants were asked what the score was at the end of the first quarter. For the Super Smash Bros. Ultimate video, participants were asked who won the competition at the end. All 73 participants answered the content of the video correctly, but 22 participants answered the result at the end incorrectly. Due to content being the main focus of the attention checks, all 73 participants that answered content question correctly were used in the analyses.

To assess sport-confidence in athletes, the Sport Confidence Inventory (SCI; Vealey & Chase, 2008; see Appendix B) was used. This measure is a 14-item scale rating how confident an individual is pertaining to three domains of sport performance, with five questions for SC-PST, four for SC-CE, and five for SC-R. The ratings are on a 7-point Likert scale (1 = *can't do it at all*, 7 = *totally certain*) with higher ratings reflecting more confidence in one's own athletic abilities. The participants were given the instruction prompt to rate "how certain are you with respect to" followed by sample items of each type. This included "you can execute the physical skills necessary to succeed" for SC-PST, "you can successfully make critical decisions during competitions" for SC-CE, and "you can regain your mental focus after a performance error" for SC-R (Frischknecht et al., 2016; Paquette & Sullivan, 2012). All scores were averaged to represent a mean score on each domain, including a composite score representing overall sport-confidence (SC-Total). Previous research demonstrated adequate reliability with alpha levels of .89 for SC-PST, .85 for SC-CE, and .89 for SC-R (Machida et al., 2017).

The Sport Imagery Questionnaire (SIQ; Hall et al., 1998; see Appendix C) was used to measure imagery use in participants. This is a 30-item questionnaire equally rating how often athletes use the five different types of imagery: I-CS, I-CG, I-MS, I-MGM, and I-MGA. The ratings are on a 7-point Likert scale (1 = *rarely*, 7 = *often*) with higher ratings reflecting greater use of a specific type of imagery. Sample items of each type include “I can easily change an image of a skill” for I-CS, “I make up new plans/strategies in my head” for I-CG, “I imagine the audience applauding my performance” for I-MS, “I imagine myself being mentally tough” for I-MGM, and “I imagine the excitement associated with competing” for I-MGA (Hall et al., 1998). All scores were averaged to represent a mean score on each domain, including a composite score representing overall imagery use (I-Total). Previous research demonstrated construct validity with alpha coefficients ranging from .80 to .87, as well as internal reliability with alpha levels ranging from .77 to .88 (Weinberg et al., 2003).

At the end of the survey, self-report measures were used to assess demographic information within the sample population (see Appendix D).

Procedure

Participants that signed up for the study through SONA or Helper Helper were provided with an anonymous link through which to participate. If athletes chose to participate after training sessions, a printed out QR code was shown for them to scan with their phone. After signing up for the study using one of the three methods, participants were able to complete the study entirely online through Qualtrics. Informed consent was obtained before beginning the study. After providing informed consent, each participant confirmed that they were a member of the SFA football team as determined by the NCAA. Next, athletes were randomly assigned to the sport esport video group or the control esport video group, where they watched their respective video after reading the instructions. The attention check questions immediately followed the end of each video. Participants then progressed to both the SCI and the SIQ, which were randomly ordered, and completed both scales according to the instructions. The demographics section was provided after the scales, followed by the debriefing. Participants were thanked for their time and the intent of the study was made known.

RESULTS

Hypothesis One

To test the first hypothesis that participants in the sport esport video group would report higher scores on SC-CE and SC-R than those in the control esport video group, while not differing in SC-PST, a one-way Multivariate Analysis of Covariance (MANCOVA) was conducted. The independent variable was categorized by which esport video the athlete watched, while the dependent variables consisted of the sport-confidence self-reports SC-CE, SC-R, SC-PST, and SC-Total. Although SC-Total was not included in the hypothesis, it was included in the analyses to gain a better understanding of the overall relationship among the variables. Due to the variability of individual engagement with video games, prior experience with Madden 21 and Super Smash Bros. Ultimate were controlled for as covariates.

In checking for assumptions with MANCOVA, it was found that the data were non-normally distributed, with most scores reporting towards the higher end of the scale. The skewness reports of SC-CE, SC-R, SC-PST, and SC-Total were -1.21, -1.16, -1.22, and -1.25, respectively. Negative skews for all the dependent variables could be attributed to the idea that male overconfidence in sport has been perceived to relate to better social success, increasing the desire to be overconfident (Murphy et al., 2018). To correct for this, the non-normal distributions were reflected, a constant of one was added, a logarithmic transformation was applied, and then reflected back to restore original order (Osborne, 2002). After conducting these modifications to the data, the skewness reports and distributions met the assumptions of normality. All other assumptions to run a MANCOVA were met. When initially viewing the means between groups, the sport esport video group reported lower scores across all dependent variables (see Table 1). Although this was the case, the results of the one-way MANCOVA yielded non-significant findings. There was no statistically significant difference among the type of esport video watched on the combined sport-confidence dependent variables after controlling for prior experience, $F(4, 66) = .574$, $p = .682$, $V = .034$, partial $\eta^2 = .034$. Due to this, no further analyses were performed.

Table 1
Means and Standard Deviations for Sport-Confidence Dependent Variables

Dependent Variable	Sport Esport Video		Control Esport Video	
	M	*SD*	*M*	*SD*
SC-CE	5.18	1.28	5.33	1.43
SC-R	5.15	1.34	5.28	1.38
SC-PST	5.28	1.35	5.34	1.46
SC-Total	5.21	1.31	5.31	1.40

Note. *N* = 73. SC-CE = sport-confidence cognitive efficiency; SC-R = sport-confidence resilience; SC-PST = sport-confidence physical skills and training; SC-Total = sport-confidence total.

Hypothesis Two

To test the second hypothesis that athletes in the sport esport video group would score higher in I-CG, I-MGM, and I-MGA than those in the control esport video group, while not differing in I-CS and I-MS, the previous analyses were replicated. A one-way

MANCOVA was conducted with esport video group as the independent variable, I-CG, I-MGM, I-MGA, I-CS, I-MS, and I-Total as the dependent variables, and prior experience with Madden 21 and Super Smash Bros. Ultimate as the covariates. In the same way, while checking for assumptions with MANCOVA it was observed that the data were non-normally distributed with scores leaning to the higher end of the scale. Di Corrado and colleagues (2020) reported that as athletic skills increase, imagery ability does too. Since college athletes are considered highly skilled with regards to their sport, these findings support that claim. To correct for the non-normally distributed variables, the same transformations were made as before (Osborne, 2002). Once the data met all assumptions, the MANCOVA was performed. Contradictory to the sport-confidence findings, mean reports for all but one of the dependent variables were higher in the sport esport group than the control esport group (see Table 2). Despite this observation, the results of the one-way MANCOVA were again non-significant. There was no statistically significant difference among the type of esport video watched on the combined imagery dependent variables after controlling for prior experience, $F(4, 64) = .574$, $p = .392$, $V = .091$, partial $\eta^2 = .091$. Due to this, no further analyses were performed.

Table 2

Means and Standard Deviations for Imagery Dependent Variables

Dependent Variable	Sport Esport Video		Control Esport Video	
	M	*SD*	*M*	*SD*
I-CG	5.24	1.22	5.13	1.18
I-MGM	5.30	1.24	5.40	1.35
I-MGA	5.19	1.12	5.10	1.24
I-CS	5.20	1.22	5.16	1.21
I-MS	5.22	1.24	5.18	1.22
I-Total	5.23	1.16	5.19	1.19

Note. N = 73. I-CG = imagery-cognitive general; I-MGM = imagery-motivational general-mastery; I-MGA = imagery-motivational general-arousal; I-CS = imagery-cognitive specific; I-MS = imagery-motivational specific; I-Total = imagery total.

DISCUSSION

The growth of esports has been monumental for many different populations. With regards to the video game community, the addition of esports to major athletic competitions has created a gateway into challenging the traditional definition of an athlete. In what are considered traditional sports, the development of better and more realistic sport video games has provided athletes opportunities to engage in aspects of their sport without physical exertion. The uses and gratification framework provides a better understanding in what, and how, people plan to gain from esports and their videos (Sjöblom & Hamari, 2017). One of the purposes of watching and playing esports is for observational learning, which is known to be an effective way in enhancing sport performance (Chen et al., 2020; D'Innocenzo et al., 2016; Farrow & Abernethy, 2002; Horn, 2008; Weinberg & Gould, 2014). In relation to sport performance, sport-confidence and imagery are two crucial aspects that have been found to improve with the use of videos (Law et al., 2018; Smith & Holmes, 2004; Wakefield & Smith, 2011). There have not been many studies, however, looking at how video game videos specifically could be used to affect sport-confidence and imagery use. The current study aimed to fill a gap in this literature, investigating the relationships among esport videos, sport-confidence, and imagery use.

For hypothesis one, the results did not support the proposed prediction. There was not a statistically significant difference between the video conditions. Interestingly though, the control esport group reported higher scores across all variables compared to the sport esport group. One possible explanation for this could be how the content of the videos was perceived. The Madden 21 video consisted of an interception and a turnover on downs, with neither team scoring. From the perspective of an offensive position player, these are negative outcomes that could have influenced athletes to feel less confident in their abilities. In the Super Smash Bros. Ultimate video, there was one character that ended up winning by defeating the others and coming back from behind, which could be perceived as a positive outcome that made the athletes feel more confident in their own abilities. The importance of content perception supports the findings of O'Donoghue (2006), who reported that different types of videos directly relate to different athletic enhancements. Another observation in the results suggested that when viewing mean scores between the two groups, scores for SC-PST and SC-Total reflected smaller differences than SC-CE and SC-R. It was predicted that SC-PST would not differ between groups and having the smallest mean differences could be due to the non-physical and virtual aspects of the esport videos. These ideas are purely speculative though and were not found to have statistical merit.

The results testing hypothesis two also did not fully support the proposed prediction, as there was not a statistically significant difference among the variables. Although the results were non-significant, the sport esport group reported slightly higher mean values compared to the control esport group across all variables but I-MGM.

Compared to the mean values from hypothesis one, the slightly higher mean values observed in the esport group in hypothesis two may have resulted from the differences between sport-confidence and imagery. Being able to see players from their sport, as opposed to fictional characters, could have increased the ability to mentally visualize themselves while engaging in the SIQ. This supports findings by Wright and colleagues (2022) who recommend using specific action observation videos when engaging in imagery interventions. It seems that after watching a video of a sport in action, there could be an increase in imagery ability. Across all imagery variables, the I-MGM means were the two highest means, with the control esport group being higher than the sport esport group. As previously mentioned, both the Madden 21 and Super Smash Bros. Ultimate videos portrayed possibly negative outcomes, with the Super Smash Bros. Ultimate character coming back from behind to win the competition. Participants in the sport esport group could have observed the negative football results and recognized how to overcome them, increasing their I-MGM. Seeing the character in the control esport video continue despite difficulty, to eventually win, might have influenced the participants' ability to engage in I-MGM also. This supports the idea that watching others perform a skill leads to a perceived increase in self-ability to perform that skill (Kardas & O'Brien, 2018).

For both hypotheses, one possible explanation for non-significant results could be due to the lack of individual immersion in the videos. Holmes and Collins (2001) suggest that when working with athletes to improve aspects of their performance, it is important to tailor the training regimes to the athletes' needs. The strategies used in the videos, such as offensive plays or defensive formations, might not be specific to each player or their position. If the athletes were not able to relate to the characters in the videos, their self-reports may have reflected that. When considering the extent to which participants saw themselves as a player in the video game, the esport group reported a slightly lower mean than the control group ($M = 2.97$ vs. $M = 3.11$). This mean difference, though not significant, suggests that athletes may not have identified with the football players in the game as much as expected. The lack of relation between the participants and the characters may have led to a lack of manipulation by the proposed independent variable, potentially reducing the internal validity of the study.

Another aspect of the null results could be that the videos were not long enough to engage the participants. Due to the desire to keep the survey short, each clip was only five minutes in length, which might not have been long enough for the athletes to get immersed into the characters and strategies involved. Researchers have emphasized the need for breaking down and repeatedly watching videos being used to get the full effects (Chen et al., 2020; Law et al., 2018; O'Donoghue, 2006). A typical Madden 21 game is 60 minutes long, which is a considerably longer amount of time to get involved into all facets of the game. If the video did not effectively simulate the experience of playing the sport, the possibility of not identifying with the characters may have affected the perceptions of their sport-confidence and imagery.

Limitations

A positive and negative aspect of the study was the use of an online survey. Online studies can be beneficial due to the ease of access in participating. There is no longer a need to sign-up for an in-person time slot, allowing participants opportunities to engage with the study on their own time. There is also not a limitation to geographic location, with participants being able to take the survey from anywhere desired. While these are some positive outcomes of the online nature, there are also negative ones too. Due to there being no in-person researcher to observe participants, there is no guarantee they actively engaged with the survey. In this study the independent variable was the type of esport video watched, and participants were required to watch a five-minute clip before moving onto the dependent variable sections of the survey. It is possible that an athlete did not pay attention to the video at all and continued onto the next sections anyway. Many participants took the survey on their phone, which may have also been distracting during the esport video and sections that followed. As a result, participants might have interacted with the videos less than intended.

If participants did interact with the videos as intended, another limitation could be alternative explanations for the proposed manipulation. While observational learning was the goal of watching the esport videos, other factors could have played a role in the possible results. One idea is the theory of arousal, which within sport refers to the levels of mental activity, emotion, physical energy, and physiological reactivity present

(Zaichkowsky & Naylor, 2004). It has been found that moderate levels of arousal are optimal for athletic performance, following an inverted-U graph shape (Howland, 2007). If the videos significantly affected arousal, this could have led to an alternate explanation to observational learning. If the videos did not significantly affect arousal, this could explain the lack of statistically significant results, also providing insight into the effectiveness of the esport videos used. The effects of the esport videos on arousal warrant further research. Although arousal could be a factor involved, both videos likely evoked similar levels of arousal due to the nature of the clips. With both videos being action-based esport videos using strategy and maneuvering to result in desired outcomes, it is plausible the arousal effects equalized each other. However, the inability to rule out general arousal as a confounding influence is a limitation of the current study.

Unfortunately, the sample population used in analyses did not meet the initial power analysis. Using G*Power, a power analysis was conducted prior to the start of data collection, which suggested that a total sample size of 100 participants would achieve an alpha of .05 and a power of .95 (Faul et al., 2007). At the time of ending data collection, there were 105 active players on the official SFA football roster (SFA, 2022). Out of those 105 players, 93 chose to participate in the study, equating roughly to an 89% response rate. In working with the football team, everything was done to obtain as many participants as possible. Once engagement with the study ceased, it was hypothesized that the football players who wanted to participate in the study had likely done so. Due to a limited number available in the target population, a possible ceiling effect for data collection could have been reached. Regarding these factors, a compromised power analysis was run to assess proposed power with alpha and sample size. With 73 participants and the alpha set at .05, the power analysis reported a power of .83 (Faul et al., 2007).

Although it was adjusted for, the non-normality of the sample population could have been a factor in the obtained results. Many participants self-reported on the higher end of the scales, which could be attributed to accurate high levels of sport-confidence and imagery use or to the overconfidence in self-perception described earlier. As college athletes are considered to be highly skilled at reflecting on their performance, the similarities across groups could be attributed to participants already being good at mentalizing their own performance before engaging in the study. There are also certain limitations that come with self-report variables as opposed to quantitative observations. It has been found that individuals are biased when it comes to self-reports, and these biases could have been also increased due to the additional online nature of the study (Rosenman et al., 2011). The combination of highly skilled athletes and possible self-report biases may partially explain the lack of predicted results in the current study.

Future Research

The need to examine the relationship between video games and athletes has never been more present. Esports are evolving with new and improved versions coming out every year (Clement, 2022). An addition to these advancements is the concept of XR games, which are a combination of augmented reality (AR), virtual reality (VR), and mixed reality (MR) technologies (Goode, 2019). Sport psychologists have already begun to investigate the relationship between VR technology and sports (Neumann et al., 2018). Future studies could research how the use of VR training programs might relate to specific aspects of performance in athletes. The importance of tailoring training programs to the athlete being worked with was emphasized throughout this study. Using updated technology and extended periods of video use might lead to a better understanding of the quality and length required for videos to have positive training effects. Future research could explore using specific videos tailored to an athlete's needs.

As each athlete has different training needs, they also have different skill levels that relate to performance. Within a supplemental analysis, it was found that as the number of games a player started increased, their SC-PST, SC-R, and SC-Total reports decreased, $r(73) = -.257$, $p = .037$, $r(73) = -.274$, $p = .026$, and $r(73) = -.248$, $p = .045$, respectively. This negative correlation between number of games started and sport-confidence supports the concept of the Dunning-Kruger effect (Kruger & Dunning, 1999). The Dunning-Kruger effect hypothesizes that individuals within the lower percentile of performance on a specific task likely overestimate their ability on that task (Dunning, 2011). Within motor performance, it was shown that those who performed the worst on a hand-grip strength test overestimated their skills the most, and those that performed the best underestimated their skills the most (Tremayne et al., 2022). The current study found evidence for these effects to be present within collegiate football athletes, regardless of the content of the esport video watched. Further research could look at the relationship between skill level and sport-confidence to assess how these effects relate to performance in sports. Findings in this domain would allow sport psychologists to gain a better understanding of how to form training programs with regards to individual athlete's performance, confidence, and imagery use.

Testing out which videos work and which ones do not is another avenue for future research. The videos used were general videos that exemplified whole team strategies more than individual player feedback. Viable study options could compare the effectiveness of these general-purpose videos to personally-tailored ones. Conducting these studies in-person could provide more in-depth results. A replication of the current study, using in-person methods, could validate or reject the findings at hand. Obtaining baseline reports of sport-confidence and imagery use could also be an efficient way to assess the differences that occur with video games. Using videos where an athlete succeeds from the start versus coming back from behind may lead to significant findings about perseverance. Studying dominant performances compared to defeat performances could point toward different aspects of learning from the use of video feedback. With regards to specific esport videos, other athletic performance variables could be explored to continue finding new ways for athletes to improve.

In sum, filling in and building off existing literature could provide many avenues for athletes to constantly get better, even while not actively performing. Video feedback mechanisms provide a simple and potentially engaging way for athletes to learn from the past and others through observational learning. As the worlds of esport and traditional sports continue to collide, the opportunities for both parties to gain is clear. Esport and traditional sport players both have ways to improve from the continual expansion of what is considered to be an athlete.

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APPENDIX A

Attention Checks

1. What was the content of the video you just watched?
   - A Madden 21 video game
   - A Minecraft video game
   - A Super Smash Bros. Ultimate video game
   - A Tetris video game
   - None of the above

2. What was the score at the end of the first quarter?
   - Buccaneers 7 – Chiefs 7
   - Buccaneers 0 – Chiefs 0
   - Buccaneers 0 – Chiefs 14
   - Buccaneers 31 – Chiefs 9

3. Who won?
   - Mario
   - Bowser
   - Kirby
   - King Dedede

4. To what extent did you see yourself as a player in the video game?
   - 1- Not at all
   - 2- Not really
   - 3- Somewhat
   - 4- Mostly
   - 5- Completely

5. To what extent did the players act as you would have wanted them to?
   - 1- Not at all
   - 2- Not really
   - 3- Somewhat
   - 4- Mostly
   - 5- Completely

APPENDIX B

Sport Confidence Inventory

How certain are you that… on a scale of 1 (can't do at all) to 7 (totally certain)?

Physical Skills and Training

1. You can execute the physical skills necessary to succeed?
2. Your physical training has prepared you enough to succeed?
3. Your physical fitness level will allow you to compete successfully?
4. You can successfully perform the physical skills required in your sport?
5. You have the physical preparation that is needed to compete successfully?

Cognitive Efficiency

1. You can keep mentally focused throughout the competitive event?
2. You can successfully make critical decisions during competitions?
3. You can effectively use strategy needed to succeed?
4. You can maintain the mental focus needed to perform successfully?

Resilience

1. You can bounce back from performing poorly to successfully execute your skills?
2. You can regain your mental focus after a performance error?
3. You can overcome doubt after a poor performance?
4. You can overcome problems and setbacks to perform successfully?
5. You can successfully manage your nervousness so that it doesn't hurt your performance?

APPENDIX C

Sport Imagery Questionnaire

What is the ease you can imagine each statement on a scale of 1 (very difficult to imagine) to 7 (very easy to imagine)?

Motivational Specific (MS)

1. I imagine the audience applauding my performance.
2. I imagine other athletes congratulating me on a good performance.
3. I imagine myself winning a medal.
4. I imagine the atmosphere of receiving a medal (e.g., the pride, the excitement, etc.).
5. I imagine myself being interviewed as a champion.
6. I imagine the atmosphere of winning a championship (e.g., the excitement that follows winning, etc.).

Motivational General-Arousal (MG-A)

1. When I imagine a competition, I feel myself getting emotionally excited.
2. When I imagine an event/game that I am to participate in, I feel anxious.
3. I imagine the excitement associated with competing.
4. I can re-create in my head the emotions I feel before I compete.
5. I imagine the stress and anxiety associated with competing.
6. I imagine myself handling the stress and excitement of competitions and remaining calm.

Cognitive Specific (CS)

1. I can easily change an image of a skill.
2. I can mentally make corrections to physical skills.
3. When imagining a particular skill, I can consistently perform it perfectly in my mind.
4. I can consistently control the image of a physical skill.
5. Before attempting a particular skill, I imagine myself performing it perfectly.
6. When learning a new skill, I imagine myself performing it perfectly.

Cognitive General (CG)

1. I imagine alternative strategies in case my event/game plan fails.
2. I make up new plans/strategies in my head.
3. I imagine each section of an event/game (e.g., offense vs. defense, fast vs. slow).

4. I imagine myself continuing with my event/game plan, even when performing poorly.
5. I imagine executing entire plays/programs/sections just the way I want them to happen in an event/game.
6. I imagine myself successfully following my event/game plan.

Motivational General-Mastery (MG-M)

1. I imagine myself being in control in difficult situations.
2. I imagine myself to be focused during a challenging situation.
3. I imagine myself working successfully through tough situations (e.g., a power play, sore ankle, etc.).
4. I imagine myself being mentally tough.
5. I imagine giving 100% during an event/game.
6. I imagine myself appearing self-confident in front of my opponents.

APPENDIX D

Demographics Questions

1. What is your current age in numerals? (e.g. 18) ___

2. What is your biological sex?
- o Male
- o Female
- o Prefer not to answer

3. What is/are your racial identification(s)?
- o American Indian/Alaska Native
- o Asian
- o Black or African American
- o Native Hawaiian or Other Pacific Islander
- o Middle Eastern, North African
- o White
- o More than one race
- o Not listed/Unknown (please specify): _____

4. Are you of Hispanic, Latino, or Spanish origin?
- o Yes
- o No
- o Prefer not to answer

5. What classification in college are you currently in?
- o Freshman
- o Sophomore
- o Junior
- o Senior
- o Graduate

6. In the previous week, how many hours did you spend *playing* video games? (e.g. 2) ___

7. In the previous week, how many hours did you spend *watching* video game videos? ___

8. In the previous week, how many hours did you spend *training/practicing* for your sport? ___

9. In the previous week, how many hours did you spend *watching film* of your sport? ___

10. How much prior experience do you have with the video game Madden 21?

- No experience at all
- A little experience
- Some experience
- A lot of experience

11. How much prior experience do you have with the video game Super Smash Bros. Ultimate?

- No experience at all
- A little experience
- Some experience
- A lot of experience

12. How many years have you been playing football? (e.g. 2) ___

13. What classification in football are you?

- 1st year
- 2nd year
- 3rd year
- 4th year
- 5th year

14. To what extent are you a scholarship athlete?

- Full
- Partial
- Walk-on

15. Do you primarily play offense, defense, or special teams?

- Offense
- Defense
- Special teams

16. What position do you *primarily* play?

- Quarterback
- Running back

- Offensive line
- Tight end
- Wide receiver
- Defensive line
- Linebacker
- Cornerback
- Safety
- Kicker
- Other (please specify): ______

17. In how many games last season did you play? (e.g. 2) ___

18. In how many games last season did you start? ___

19. In the previous season, how many games did you miss due to injury? ___

20. Are you currently healing from an athletic injury?
- Yes
- No
- Prefer not to answer

21. Have you ever injured yourself while playing football, resulting in missing a practice or game?
- Yes
- No
- Prefer not to answer

VITA

After completing his work at Cypress Falls High School, Houston, Texas, in 2016, Kelton Mahon entered Baylor University at Waco, Texas. During the summer of 2019, he was able to study abroad at Christ Church, Oxford University, Oxford, United Kingdom. He received the degree of Bachelor of Science in Psychology from Baylor in December of 2019. During the following seven months, he went to live with his grandparents in Tehachapi, California, and was employed as a substitute teacher at the Tehachapi Unified School District. In August of 2020, he entered the Graduate School of Stephen F. Austin State University, Nacogdoches, Texas, and received the degree of Master of Arts in Psychology in December of 2022.

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