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An Analysis of Potential VR Sports Game Consumers' Prospective Motives

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Abstract

Virtual reality, a realistic and immersive 3D computer generated virtual environment, has received much attention from both practitioners and scholars for decades due to the uniqueness of the technology, application, and innovation. VR's application to the gaming industry is nothing new, yet academic endeavors to understand VR sports games are limited. Therefore, this exploratory study is prepared to understand potential motives for using and purchasing VR sports games. Focus group interviews of 16 participants from two different universities in the Northeastern U.S. were used to conduct an in-depth exploration of sport video gamers' interest in VR sports games. After a thorough analysis and synthesis of the qualitative data from the focus groups, the researchers were able to identify four potential motivations to play VR sports games including novelty, simulation, and sport knowledge, as well as realism. Additionally, five potential barriers for playing VR sports games were also identified including financial perceived constraint, skepticism on quality, lack of time, limited social interactions, and preference for actual sports participation. This study extends the minimal research in this area and provides significant practical implications for sports organizations and VR sports games developers as well as publishers.

Keywords: VR sports games; potential motives; perceived barriers

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1.Introduction

As new, emerging technology is becoming widely available, businesses are hoping to further digitalize business operations to maximize value and decrease operational costs. Virtual reality (VR), for example, a realistic and immersive 3D computer generated virtual environment, has received much attention from both practitioners and scholars for decades due to the uniqueness of the technology, application, and innovation (Zheng et al., 1998). VR technology holds promise as one of the ways organizations can further digitalize their business operations.

According to Market Watch (2019), the global VR video gaming market has grown exponentially over the last few years to $10.3 billion in 2018 and is projected to reach $40.2 billion by 2026. Recently, the sports industry has been active in embracing and applying the VR technology for value creation. The Major League Baseball (MLB), Major League Soccer (MLS), National Basketball Association (NBA), and National Hockey Association (NHL) are some of the examples of the major sports leagues that are implementing VR technology for business innovation (Young, 2020). The continuous application of VR technology by the entertainment industry for its content creation, particularly, in the video game industry, which is considered one of the largest VR markets, is particularly noteworthy (Jang & Park, 2019). Facebook, for instance, has its own VR division, Oculus Studio, and continuously invests in VR and develops VR sports games (Oculus, n.d.). In October 2021, Facebook changed its name to "Meta", a reference to a virtual world (metaverse), indicating a new direction for the big technology company towards immersive virtual and augmented realities (Meta, 2021). Apple recently acquired a startup firm that specialized in VR games (Sonnemaker, 2020), and may further penetrate into the VR sports games market. Global technology, non-sports organizations, such as Facebook and Apple, are also trying to redefine the sports experience using VR sports games. Several VR sports games (e.g., *Creed: Rise to Glory, VR Sports Challenge, the Thrill of the Fight, Eleven: Table Tennis VR, Everyday Golf VR,* etc.) are now available to video gamers. While there seems to be industry-wide attention to technology-driven VR sports games that can potentially revolutionize the entertainment and video game industries, academic discussion on the evolution of emerging VR sports games is underexplored and under-examined in literature.

Given the lack of understanding about VR sports games particularly with regards to potential consumers' perspectives, it is helpful for VR equipment manufacturers, VR game developers/publishers, and sports organizations (e.g., leagues) to understand potential motives for playing and purchasing VR sports games. Therefore, this study addresses the following research question using a qualitative exploratory approach, specifically a focus group study: "What drives potential consumers to become interested in playing VR sports games?" The answers to this question will be beneficial to VR gear manufacturers and game publishers partnering with sports organizations and sport marketers to better understand potential consumer motives. Practically, grasping poten-

tial VR sports consumers' interest can provide valuable insights for those businesses to develop appealing products, better serve their customers, and expand their market strategically. Examining VR sports games and their potential consumers is timely and appropriate as new technologies present more and more sport consumption choices.

2.Literature Review

2.1 Previous Studies on Video Gamer Motives

It is important to review the theoretical and empirical literature on traditional video gamer motives in order to assume their prospective motives given the lack of studies on potential VR sports gamers. One of the earliest video game motivation studies was conducted by Yee (2006), who carried out a factor analysis on data collected from a large group of actual gamers to develop an empirical model of player motivations. Yee focused on Massively Multiplayer Online Role-Playing Games to reveal various motives of game players. He found three categories of player motivation, such as, achievement (advancement, mechanics, and competition), social (socializing, relationship, and teamwork), and immersion (discovery, role-playing, and customization). According to this categorization, video game players focused on achievement by seeking game mastery, competition, and gaining power within the game. Video gamers also wanted to be social by interacting with other players and developing in-game relationships. Additionally, video gamers were motivated by a sense of immersion, desiring an escape real life for various reasons, engage in role-play and being a part of the virtual story.

Many motivational theory-based studies have followed Yee's (2006) empirical research. More specifically, researchers have primarily employed the self-determination theory (SDT) (Ryan & Deci, 2000) or the uses and gratification theory (U&G) (Blumer, 1933) as a theoretical foundation in video game motivation studies. SDT-based research demonstrates that video gaming enhances intrinsic motivation to satisfy three psychological needs, specifically competence, autonomy, and relatedness (Przybylski et al., 2010). For instance, Ryan et al. (2006) found that gaming motivation can be explained by experiences of competence (i.e., perception that the game provided a challenging but not overwhelmingly difficult experience and enhanced efficacy) and autonomy (i.e., the degree to which participants felt free, and perceived opportunities to do activities that interest them) when playing video games. They also suggested that both in-game competence and autonomy enhance participants' enjoyment and preference for future play of the video games. In-game relatedness (i.e., how connected participants felt to other players in the game), was also a factor influencing game enjoyment and intentions for future play within massively multiplayer online gaming contexts.

Przybylski et al. (2010) confirmed the basic psychological needs for competence, autonomy, and relatedness while playing video games. They also compared the SDT motivation model to Yee's video game play motivation taxonomy. The researchers found correlations between SDT-driven constructs (i.e., autonomy, competence, and relatedness) and Yee's motives (i.e., achievement, social, and immersion). They also found that SDT-driven predictors all accounted for

significant independent variance for dependent variables of game enjoyment and intended future play, whereas Yee's motives were found not to be significant. This apparent contradiction between Yee's motivation taxonomy and the SDT as applied to gamers' motivations suggests an inconclusive outcome, which provides justification for more and finer grained studies to know more and understand better.

In a more recent SDT-based video game motivational study, Banyte and Gadeikiene (2015) highlighted the role of experiential motivation in video game engagement, in addition to intrinsic and extrinsic motivations. Experiential motivation includes intrinsic motivation but more social aspect based (e.g., communication and cooperation with other gamers), while intrinsic motivation is more personal and individual based (Koo et al., 2007). According to Banyte and Gadikiene, experiential motivation consists of perceived enjoyment, concentration (not realizing the times that has elapsed and surrounding noise), and escape. They found that experiential motivation influences video game engagement in terms of immersion, presence, and flow.

When addressing the question of motivations for playing video games, the U&G has also been frequently used by researchers as a theoretical framework. U&G states that the motivation behind playing video games is a particular gratification that is sought (Lucas & Sherry, 2004). Using the U&G paradigm, Sherry et al. (2006) identified six motives for playing video games; namely competition, challenge, social interaction, diversion, fantasy, and arousal. They found social interaction was the main reason for playing video games and that individuals use video games to interact with friends and learn about the personalities of others. Competition was concerned with proving to other people who has the best skills and can react or think the fastest. Challenge was related to pushing gamers themselves to a higher level of skill or personal accomplishment. They also suggested that video games are used to avoid stress or responsibilities and people played video games because of the appeal of being able to do things they cannot do in real life. Lastly, individuals played video games in response to fast action and high-quality graphics and to get emotionally stimulated (Sherry et al., 2006).

These findings make a strong case for exploring these motivations in VR considering that its technological affordances would potentially enhance the desirable properties of video games. For example, whereas Sherry et al. found social interaction to be the main reason for playing video games, a VR experience that allows for not only viewing the virtual world, but through embodying an avatar, and in real time interacting with avatars representing other real people, has the potentials to amplify both individual and social "presence" and hence the social interactions.

Huang and Hsieh (2011) employed the need-satisfying and process-experiencing aspects of online game motives by combining the U&G and flow theory to predict consumer loyalty toward online games. Grounded in U&G, they suggested entertainment and sociality as motives. They included entertainment as playing with the features in the online games can be considered a form of entertainment that the online gamer could use to fill up his/her free time. Sociality was included

as a motive because online gamers are able to assume different roles, exchange virtual assets, develop strong relationships, and strengthen social ties (Kolo & Baur, 2004; Williams, 2006). From the flow theory perspective, Huang and Hsieh suggested challenge, control, and interactivity as motives for playing online games. They suggested that online games allow the players to constantly improve their gaming skills through learning to overcome the challenges from which the gamers acquire a sense of personal achievement. The variable control measured feeling unrestricted or free to act in a variety of ways under a specific situation in the virtual environment. Interactivity was included to measure the extent to which an individual perceives that gaming brings forth interaction between players mediated by the virtual environment (Chung & Tan, 2004; Hoffman & Novak, 2009).

Pokémon Go was the first augmented reality (AR) game that became widely available on smartphones. Rauschnabel et al. (2018) examined a framework to explain the drivers of attitudinal and intentional reactions (i.e., continuance in gaming or willingness to invest money in in-app purchases) using a survey among Pokémon Go players. Their study was based on U&G, the flow theory, and technology risk research. They found that hedonic (i.e., physical activity), emotional (i.e., nostalgia and enjoyment), and social (i.e., socializing and image) benefits, and as well as social norms influence consumer reactions. They suggested that the attitude toward using a mobile AR game is primarily driven by gratifications obtained from playing the game, including nostalgia and enjoyment. Their findings also indicated that immersive (i.e., flow) and social (i.e., image and social norms) factors predominantly drove in-app purchases.

All of the aforementioned approaches have some common and recurring themes or variables, such as competition/achievement, social interaction, autonomy, immersion and interactivity, all of which are properties that VR possess to a much higher degree than video games. Hence it is important to understand this player-device interaction better because of VR potential future applications in gaming.

2.2 Previous Studies on Sports Video Game Motives

The video game industry has partnered with sport entities because of the growing popularity of sport and video games, and sport video games have become a popular segment. Researchers have attempted to identify what makes video gamers engage with the content in sport video games Kim and Ross (2006) developed the Sport Video Game Playing Motivation Scale (SVGMS) using the U&G perspective. They identified seven dimensions of sport video game playing motivations based on focus groups and confirmatory factor analysis: Entertainment ("the hedonistic value of sport video games"), identification with sport ("a desire for the vicarious participation and experience associated with a favorite sport"), knowledge application ("the use of actual game and player knowledge while playing sport video games"), fantasy ("the enjoyment of an individual that assumes an alter ego in a virtual environment"), competition ("an individual's motivation to compete against other video game players and test their own competence"), social interaction

("the desire for individuals to be with others while playing the games"), and diversion ("the game player's motivation to avoid stress and relieve boredom") (Kim & Ross, 2006, p. 33). The researchers asserted that of the seven dimensions, knowledge application, fantasy, and identification with sport were sport video game-specific, which had not been found in previous video game studies.

While Kim and Ross (2006) utilized a media-based approach, Cianfrone et al. (2011) integrated three aspects of motivations (i.e., media, spectator, and participant) to modify and extend the SVGMS scale using more general motivation theories, as playing sports video games embraces different facets of the gamers as a media user, sports game spectator, and sport participant. In addition to the seven motives suggested in the study of Kim and Ross, Cianfrone et al. included three factors; arousal ("a gamer's emotional stimulation"), challenge ("a process gamers pushing themselves to a higher level of skill or personal accomplishments while playing sport video games"), and team identification ("gamers' identification with their favorite teams in the sport video games"). However, they removed arousal and challenge from the model due to their high inter-factor correlations with each other and the competition factor. Finally, they extended the SVGMS by adding team identification as another dimension of motives.

The VR gaming market has grown rapidly in the last few years, but it is still evolving, in particular for VR sports games. For instance, some VR games may appear unrefined in comparison to traditional video games due to limitations of control schemes and design choices (Swinhart, 2021). Additionally, some individuals experience symptoms of motion sickness, such as sweating, disorientation, and nausea while playing a VR game (Rosa et al., 2016). Therefore, VR remains niche in the video gaming market mainly due to the cost of a realistic gaming experience (Swinhart, 2021), and research is still scarce on VR sport game motivations.

Prior multiple application of SDT and U&G in video game motivation studies does not translate their applicability to prospective VR sports gamers' motivational studies. The SDT-based approach views "sustained video game engagement" as a function of a set of basic psychological needs that video game play may or may not fulfill (Przybylski et al., 2010). The U&G paradigm is centered on the reasons why individuals use media and the effects resulting from that use (Lucas & Sherry, 2004). These views require individuals to have experience in VR sports games to better understand their needs and motivation for playing VR sports games rather than focusing on learning the controls or gameplay. Although motivational studies are designed to understand and explain actual users' needs and motivations, current motivational theories can still lend insights in exploring prospective VR users' potential motives for playing VR sports games.

The superior technology that drives VR compared to normal video games call for an enhancement and update to the previous theories of motivation related to digital media (specifically video games) use. The player of a VR sports games has potentially more agency and interactivity with the in-game action. They can play a

more realistic first-person role which would affect motivational factors such as "knowledge application", "fantasy", and "social interaction" (see SVGMS, Kim & Ross, 2006). Despite the points of convergence of the theories addressed above, the gaps between them and the novelty and superiority of VR allow us to hope that this work will contribute to an updated and more robust theory of motivation driving VR sports video gamers.

3.Methods

3.1 Research Design

A qualitative research design using focus group interviews was employed to answer the research question. Focus groups are commonly used and are particularly suitable when the research aims to conduct an in-depth exploration of a topic about which little is known, as well as when the topic is specific and where the researcher is seeking the reactions of participants to an idea, product, intervention, or shared experience (Patton, 2002). Given that VR sports gaming is still an emerging technology, focus groups are considered appropriate for this study. Focus groups also provide insights into the sources of complex behaviors and motivations because participants can ask questions of each other and explain themselves to each other in a supportive environment (Morgan, 1996; Patton, 2002). Such interactions offer valuable data on the extent of consensus or diversity among the participants (Morgan, 1996).

In this study, we were particularly interested in whether current sport video gamers are interested in playing VR sports games because little is known about prospective VR gamers' points of interest in VR games. While VR games have been around for several years now, sport specific games are still rather new. During the recruitment process the researchers noticed that potential participants had an interest in sports and previous experience playing sports video games, but minimal experience with sport VR games.

The focus group interview protocol was developed through four phases as Castillo-Montoya (2016) suggested: (1) A literature review on U&G-based and SDT-based video game motivation research was conducted to draft focus group questions aligning with our research question. (2) The first author developed questions to elicit inquiry-based conversation to conduct a focus group similar to a regular conversation but relate questions to the aim of the study. (3) The first author shared the focus group protocol with the co-authors to receive feedback on the protocol and to ensure reliability of the interview questions. (4) The authors revised the focus group protocol to align with the aim of the study and to make the sequence of questions conversational and inquiry-driven (Castillo-Montoya, 2016). The following focus group interview questions were developed (see Table 1).

Table 1 *Focus Group Interview Questions*

Number	Focus Group Interview Questions
1	What level of interest do you have in sports virtual reality games?
2	What makes you interested in sports virtual reality games?
3	What level of interest do you have in buying VR equipment for playing sports video games?
4	What type of sports VR games are you interested in?
5	Which currently available sports video games will translate to VR games the best?
6	What features will you look for in VR equipment for playing sport games?

3.2 Participants and Data Collection

The study sample was drawn from two universities in the Northeastern U.S. and included a total of 16 participants in two focus groups. Both focus group interviews followed the same design and lasted between 40 and 45 minutes. The group sizes varied between six and 10 individuals. The first group consisted of 10 undergraduate students (10 male) at a small, private university, and the second group consisted of six undergraduate and graduate students (2 female and 4 male) at a large, public university. Both groups consisted of those who identified themselves as both sport video gamers and sports fans in a pre-focus group survey. Respondents were recruited through classroom announcements and participated in the study voluntarily.

Students were the target sample due to the reasons explained below. First, since students are significant consumers of sport, sport products, and sport video games, most participants in this study fit within the demographics of those who frequently play sport video games (Brownlee et al., 2015). More specifically, the average video gamers are males aged 18-34 and this demographic aligns very closely with undergraduate and graduate college students. Secondly, students are also considered a main target market for VR sports games and VR gear considering that more than a half of the most frequent video gamers are familiar with VR and are likely to play video games in VR (Entertainment Software Association, 2017). Purposive sampling is typically recommended for focus group research as meaningful discussion depends on the ability of participants to provide pertinent information (Morgan, 1996). In the case of this study, students were selected and screened due to their demographic fit and experience with sports and sport video games.

The Institutional Review Board (IRB) from both institutions approved the research, and all participants verbally agreed to their participation before a focus group was conducted. The first and second authors moderated the focus group interviews. The moderators hold doctoral degrees in Sport Management and are faculty members at each of the institutions in the study. The moderators asked the participants to discuss each of the six questions one by one. The discussions began with a warm-up exercise that involved asking participants about their interests in sports video games. The protocol included six questions (see Table 1) drawn from the literature on video game motivations (e.g., Cianfrone et al., 2011; Kim et

al., 2007; Kim & Ross, 2006). Content validity and face validity were established with a panel of experts in the field of sport management prior to focus group interviews. More specifically, the experts chosen for the panel of experts also had significant experience publishing in the sport video game area.

For the last question, moderators provided the participants four aspects of realism with their definition and asked the participants to rank the aspects from the most important to the least important to further elaborate on expected features from VR equipment. As presented in Table 2, the realism aspects were graphics, sound, natural control, and spatial presence. Realism of graphics and sound were provided as points for discussion because they were the most apparent sensory features of video games (McGloin et al., 2011). Natural control and spatial presence were included as they were considered features of VR games and equipment distinctive from traditional video games. The moderators moved to the next question when a topic had been saturated. Data collection continued until data saturation was being reached for each question. As outlined in previous research, saturation occurs when there is no information being discovered by the researchers (Saunders et al., 2018). Focus group discussions were recorded in audio format to capture as much detail as possible and review after the focus groups concluded.

Table 2 *The Aspects of Realism Presented to Participants*

Aspects of Realism	Definitions
Realism of graphics (Lin & Peng, 2015)	"A gamer's perception elicited by the sensorial depiction of the environment and characters in the video game that makes the player experience the mediated game environment as the actual physical space where he or she is present"
Realism of sound (Wood et al., 2004)	"The use of realistic sound effects, speaking characters, background music, and narration in video games"
Natural control (McGloin et al., 2011)	"A gamer's sense to the extent to use a controller that mimics body movement in real life as if he or she is actually acting out real behaviors rather than playing a video game. Spatial presence is concerned with the feeling of physical immersion within a virtual environment"
Spatial presence (McGloin et al., 2011)	"The feeling of physical immersion within a virtual environment"

3.3 Data Analysis

The recorded group discussions were transcribed verbatim by the authors. Following the completion of the transcription process, all transcripts were read independently multiple times by the authors. Following in-depth discussion of the readings, a coding system was developed to organize the data: meaningful sections of text were then systematically and sequentially coded and categorized following a general inductive approach (Thomas, 2006). According to Thomas, a general inductive approach is used to clarify the data reduction process by describing a set of procedures for creating meaning in complex data through the development of summary themes or categories from the raw data. In this study, emerging themes were identified by studying the transcripts repeatedly and considering possible meanings and how these fitted with developing themes. After the in-depth discussion, the researchers met again to compare and discuss any commonalities and resolve differences. Patterns were examined across focus groups in order to identify issues common to all participants as well as those specific to particular groups. In the case of disagreement, the authors adopted a negotiated agreement strategy (Campbell et al., 2013). Rather than a simple majority rule, disagreement was discussed among the authors and was resolved through joint decisions until reaching an agreement. By doing so, intercoder reliability could also be ensured.

4.Findings

Response categories coalesced under several themes related to the topics of discussion. Results are organized according to salient topics and themes. Analysis revealed potential motives for VR sports games and perceived barriers to playing sport video games in VR.

4.1 Potential Motives for Playing Sport Video Games in VR

Novelty

Some participants who showed a high level of interest in playing video games throughout the focus group studies conveyed excitement about the new format of playing sport video games in VR. For example, one participant stated that

> I was actually on Twitter the other day. I saw, like, a video. Somebody actually like… you know… like headgear, sensors, stuff like that and like running on a treadmill kind of... finding Call of Duty. And I thought that was pretty cool. So I can imagine, like playing football or hockey, that would be insane. I'll buy it. What actually comes out, I'll buy one.

While VR technology is not entirely new, having been around more than 30 years, it is currently experiencing a re-emergence in a new, affordable, commercially available format. Consequently, many people are now experiencing VR for the very first time.

Simulation

Just as playing sport video games, some participants stated simulation as a potential reason to play sport video games in VR in the future. Unlike traditional video games, the participants expected not only to mimic their favorite play-

ers' skills, but also to view the actions from the eyes of their favorite athletes while playing sports video games in VR. Participants also expected the virtual experience of being at the arena and interacting with the players. For instance, one participant said that

> I think the best thing that would come from that is actually being there at the arena. That would be cool to get the sense of being out on the Quicken Loans floor. That would be cool if I could make a pass to Kyrie Irving and he's going to shoot a 3-pointer and make it. It would be cool to interact with the players. That would be the only two things being at the arena and interacting with the players.

People may have limited access to non-mainstream sports, especially sports with high risk of injury (e.g., skiing, ski jumping, snowboarding, skateboarding, etc.). However, VR can provide opportunities for sports video gamers to try sports, which are not easily available. More specifically, participants mentioned as follows:

> I think the easiest would be some of the extreme sports like snowboarding or skiing. You pretty much stay in one motion and if you have that board and feel like you are on the skies and slopes. It causes you to move more than bowling and shooting a bow and an arrow, so you get that realism effect. But you're not putting yourself in danger like if you have to run around in basketball and might run into a wall or something… As I said, I think skiing, like ski jumping, will be a sick experience to do. But anything that you fly, like... anything you actually… anything like extreme sports, something like that… stuff you wouldn't… like… actually do all the time.

Sport Knowledge

As mentioned earlier in the method section, the participants were self-identified as sports fans. They were involved in sports by playing, watching, and following sports. They wanted to play sports video games in VR in hopes of applying their knowledge of sports to the gaming situation and comparing it to their actual sports participation. One participant was skeptical of the simulation experience VR provides, while several participants mentioned that the vicarious experience of VR may increase sports fan experience. In particular, VR experience may increase the knowledge of sports for sport fans. Participants stated that

> We've all played sports and we know that experience. Compared to, like again, Call of Duty war, most of us haven't been in combat, so we don't really know what that's like. But we know what sports are like and how it feels like. So we can compare virtual reality to the real-life experience.

> I think like what we've said earlier, like just being a quarterback and like a football stadium and seeing, like what the quarterback sees… I think that would be really hard. But I think it will be pretty cool to try. I know people may appreciate the sport more because they actually see how it is.

Realism

At the end of each focus group interview, the moderators shifted the focus of discussion to realism, as a goal of VR systems is to provide a realistic experience for the users through the interface (Slater et al., 2020). Several participants seemed to expect a level of realism out of VR that exceeds what may be experienced in traditional video games. When asked about their level of interest in and expectations of VR sports games, one participant said: "I think it's almost like Call of Duty one. I think, like, making a movie about it. It's like, it's supposed to be virtual reality, but it's actually real. So I think that will be really cool."

The moderators asked the participants to rank four aspects of realism from the most important to the least important in a way to facilitate a discussion on expected features from VR equipment. The four aspects of realism that were considered were natural control, realism of graphics, realism of sound, and spatial presence. As illustrated in Table 3 among the four aspects of realism, participants rated natural control the most important feature, with realism rated the least important.

One participant elaborated on natural control as the most important aspect of realism as follows:

> [Natural control was first] Because I want the actions to be similar to the real world, and I think that is what the virtual reality games are supposed to get at. Graphics were second because at least when I play video games, no one wants to play 2K with stick figures so that would be interesting. And then, I didn't really care about the sound because sometimes I even play video games without the sound on.

A total of five students chose realism of graphics as the most important aspect of realism. For example, one participant mentioned that

> The better it looks the more real it seems so that is most important for me [graphics]. You want to make it seem somewhat like a real game, like if you are throwing or moving like you are in a real game [natural control]. I'm not really too concerned, most

Table 3 *Realism Aspects Ranked by Participants: Frequency (F)*

	Aspects of Realism	*F*
Most Important	Natural control	8
	Realism of graphics	5
	Spatial presence	3
Least Important	Realism of sound	11
	Spatial presence	4
	Natural control	1

> games sound pretty good in regard to the sound of the game [sound]. I just kind of assume that it will look similar to the court or field that you are playing on. And if it is based on its graphics and that it's good, everything else will fall into line. The base of a good game has the graphics and the speed, and everything else should match it. If the graphics stink, then everything else will be bad too.

Spatial presence was rated the most important aspect of realism by three participants. One student stated,

> I felt like that's kind of the whole point of virtual reality to be in the experience so well that you feel like you're there and you feel like you can reach and touch a person or something standing next to you or near you.

The vast majority of participants considered realism of sound the least important aspect of realism. For instance, one student said that

> I think natural control is the main thing that you would want to experience when you are playing virtual reality games and graphics is also something that I will look for. It gives you more pleasure with better graphics. And same thing I don't really care about the sound when playing.

4.2 Perceived Barriers to Playing Sport Video Games in VR

Although participants revealed their interest in sports VR games, several participants were reluctant to try sports video games in VR due to high cost, potential functional risks, an untested quality, a limited space for some sports, a lack of time, limited social interactions, and their preference for actual sport participation. The main perceived barriers to playing sport video games in VR are presented below.

Perceived Financial Constraints

The participants mentioned the perceived financial constraint as a major barrier to buying VR equipment and playing VR sports games. Given the fact that participants were undergraduate and graduate students, they tend to have limited disposable income for spending on entertainment and leisure activities. As such, they seemed reluctant to bear the financial burden of buying and trying sport VR equipment. For example, one participant stated that

> I just kind of always assumed that virtual reality games would be very expensive, especially if you want to get the best kind. That's what I think will be the hardest part because the best, I mean some of them were up there for $700-$800. And I think that might be difficult to get people to buy them.

Those who do not play video games often did not find value in purchasing VR gear. Since the participants expect VR gear to be expensive, they did not want to purchase expensive equipment unless they are highly interested in video games. Several participants seemed to be risk-averse consumers given their budget constraints. They were reluctant to invest in untested VR gear before other consumers. Instead of buying expensive VR

gear to test, they would rather wait until the quality reaches a stable level. Participants said that

> I don't think it is beneficial to pay $700 or $800 for equipment that I'm not going to use on a consistent basis. It will only be used during leisure time, which I feel like college students and adults have limited leisure time with school, work, and family so that would be the number one thing to be is cost.

> I would say it probably depends on the user and how much cash they have. For me, I don't know. I mean like everybody else said, like if somebody else had it, and I used it and liked it. Then I'll probably book it and buy it more. But as for the first time, and [I] never tried it. I don't know if I will do it.

Skepticism on Quality

The participants recognized that VR is a new technology in gaming. Some participants were not sure how VR would work for sport video games and did not want to test it before other consumers. For example, one participant stated that

> The fact that we don't want to try and take the leap. We already know what a PlayStation and a Wii is. We know what to expect and then from the looks of it. It looks a lot different than a regular video game.

Additionally, several participants were skeptical of the quality of currently available VR equipment as it related to price, given a wide range of prices. Some participants said that they were willing to invest in relatively high-end VR equipment while the others did not want to buy VR equipment, even an affordable one because of their expectation of a low quality. According to a participant,

> I think [it depends on] how much quality you want. Because I just saw a virtual reality thing. It's like $900. Some guess they're good quality and pay for it. So obviously you should give what you pay for. So you aren't just basic and pay like 50 bucks. But if you want, like top notch, like I want a thought like myself in the game, they'll pay like a whole bunch of money obviously. So, that all depends on the user.

Lack of Time

Several participants mentioned they are not able to find much time to play video games, including VR sports games, due to their busy schedules. A participant stated, "For me, I don't have enough time to play it so I wouldn't spend that much money on something that I wouldn't have time to use." Another participant mentioned, "I feel like, at this point of my life, there will be no point buying that because I hardly ever play other than when I'm home on breaks."

Limited Social Interactions

While social interactions were an important reason for playing sport video games, a possible lack of social interactions made participants reluctant to use VR headsets for playing sport video games. Participants pointed out limited social interactions because they considered that VR headsets may hinder face-to-face interactions with

their friends while playing sports video games in the same space. For example, according to one participant, "Like I said it's more a social thing. So I feel like putting those glasses on and not actually interacting with my friends around me wouldn't make any sense."

Preference for Actual Sports Participation

All the participants were involved in sports at some level. Several participants liked playing video games because they could utilize their sports skills and could pretend to be their favorite players in the video gaming context. On the contrary, some participants explicitly expressed their preference for playing actual sports, rather than a virtual experience. For example, one participant mentioned that

> I would rather not have to wear something on my face, kind of make you look kind of goofy sitting there in a chair or standing there with a headset on. I can only imagine that it would be pretty stuffy and sweaty in there. But just from the standpoint of, if I want to do something, I want to do it, not experience it virtually. If I want to shoot a bow and arrow, I may go shoot a bow and arrow. Or if I want to play basketball, I'll go out and play basketball. I know in virtual reality, there's a different thing that you can do. But I think I would rather just experience it than do it through a headset.

Another participant reiterated the preference for actual sports participation as follows:

Same thing, I don't think I would really care for that. If I actually want to get the experience, I would go and do it. I think I would have to have the headset on. And if it's a group of people, would you have to pass the headset to one another or everyone has a headset? And we are sitting there in our own virtual reality world. We are here physically but created this other world. Why not just do it together than do it in a virtual reality?

5.Discussion

This study was designed to explore prospective VR sports gamers' potential motives for playing sports video games in VR. The researchers identified three potential motives in playing sport video games in VR (novelty, simulation, and sport knowledge) as well as realism as an important feature of the VR gaming system. In this study the authors also found five perceived barriers to playing sport video games in VR format: financial perceived constraint, skepticism on quality, lack of time, limited social interactions, and preference for actual sports participation. One of the key contributions of this study is the findings related to perceived barriers as this is one of the first times this has been addressed with respect to VR video game play. This has notable theoretical and practical implications in understanding consumers' perception of VR sports games and warrants future investigation.

5.1 Prospective Motives for Playing Sports Video Games in VR

Although there were several new findings in this study, many findings supported those of previous studies. In particular, these consistent find-

ings were relevant to prospective motives in VR sports games. This suggests that VR sports games can be appealing to current video gamers.

Novelty, as a potential motive for playing sport video games in VR, seems to be in line with the finding of diversion in previous studies. Diversion has been categorized by U&G researchers as one of the media use motivations, meaning an escape from routines (Ruggiero, 2000). Given that, Kim and Ross (2006) defined diversion as the game player's motivation to avoid stress and relieve boredom (p. 33), the finding of novelty corroborates the findings of their study.

Applying U&G, researchers have identified video game motivations. The finding of **simulation** was consistent with previous studies based on U&G. For instance, fantasy is related to a motivation enabling video game players to experience what they normally would not be able to do (Sherry et al., 2006). Kim and Ross (2006) identified fantasy as one of the sport video game playing motivations. They defined fantasy as "the enjoyment of an individual that assumes an alter ego in a virtual environment", which was comparable to the theme of simulation. That is, video gamers are interested in playing video games in VR to virtually experience sports that they usually are not able to play due to a variety of restrictions. For example, video gamers are able to try very costly and/or highly risky sports in VR.

In previous sport video game motivation studies, video gamers' application of their **sport knowledge** was found to be a motive (Cianfrone et al., 2011; Kim & Ross, 2006). Oftentimes, sports video gamers are simultaneously sports fans. For those sport video gamers, they may seek personal gratification in that they enjoy the opportunity to apply their knowledge of actual players and game strategies, as well as comparing the decisions they will make while playing sport video games in VR against the decisions of the player or manager in real life (Kim & Ross, 2006).

5.2 Realism

Realism was found to be an essential feature of VR sports gaming systems. This finding was consistent with a previous study based on the SDT. More specifically, in a study of Ryan et al. (2006), a concept of "presence" was suggested as a similar construct to realism. They suggested that presence makes the experience of virtual worlds feel real and authentic, by creating a compelling story line and graphic environment, and by making controls as natural or user-friendly as possible. That is, presence provides the video gamers with a sense of non-mediated immersion in a game environment.

5.3 Perceived Barriers to Playing Sports Video Games in VR

While motivation facilitates patronage, constraints or barriers can oppose it. Barriers to playing sport video games function for some individuals as adverse stimuli. Previous studies on video games and media gratifications did not consider the possible hindrances individuals may face in playing VR sports games. This study is, therefore, one of the first to consider and find support for perceived barriers as a significant factor affecting consumer's perception of VR sports games. This finding has significant implications and should

provide valuable strategic insights to researchers and practitioners.

As several participants pointed out, **financial perceived constraints** were one of the potential barriers to playing sport video games in VR. Currently, many VR headsets for video games are sold for between $19.00 and $1,400.00. Although VR technology has undergone significant improvements, several focus group interview participants were still skeptical about the quality of VR sport gaming experience. This **skepticism regarding quality** can also in some way be related to cost. This is because it is still expensive to buy all of the hardware and software components needed to play video games for a true VR experience. The Oculus Go headset for instance currently costs about $200, while specialized software and additional components such as high-quality headsets and Haptic VR suits can cost thousands of dollars (Yoo & Brownlee, 2020). Although high quality VR gaming experiences currently exist, they are limited for sport video gamers due to high costs. Thus, a majority of the more affordable VR headsets may not provide fully immersive experiences for video gamers as they are only one part of the overall cost.

Researchers have found that many video gamers considered playing video games a social activity (Westwood & Griffiths, 2010). According to a study by Lenhart et al. (2008), video games are social experiences for the majority of teenagers, as video gamers play video games with other friends or others in the same physical location or online. However, several focus group interviewees pointed out that playing a sports video game in **VR can limit their interactions with their friends** because they cannot see their friends while playing video games due to the VR headsets they need to wear. This concern can be explained by findings of Huang and Hsieh (2011). Huang and Hsieh suggested that although there is a social aspect to video games when playing video games online with others, they considered the online video gaming experience as being a lower priority for those motivated by social ends. This is because such people consider online interactions with other people to be more virtual than authentic.

Although applying video gamers' actual sport knowledge to video games was found as a potential motive for playing sports video games in VR, ironically, some focus group interview participants expressed their **preference for playing sports in person** to playing sports video games in VR. Their point was if VR is primarily for seeking immersive experiences, they will actually play sports instead of seeking a substitute. This finding can be partially explained by the study of Lee and Schoenstedt (2011), suggesting that skill building for actual playing of sport had a negative influence on the amount of time spent on sports video games. This finding might have been attributed to the components of the sample, Sport Management students. However, Lee and Schoenstedt further suggested that virtual gaming experience provides gamers with an opportunity to vicariously achieve what they cannot accomplish in a real sports setting (e.g., ski jumping, boxing, etc.).

Lack of time can also be related to an individual's involvement in sport video games. U&G suggests that individuals have a different level of involvement so that the motivation to play sport

video games in VR is influenced by how much an individual relies on it (Galloway & Meek, 1981; Ruggiero, 2000). Additionally, individuals may play sport video games in VR ritualistically or instrumentally depending on background, time, and situational demands (Rubin, 1984; Ruggiero, 2000). Just as some participants indicated in focus group interviews, playing video games may not be their priority because of their focus on academics, sports (for student athletes), and future/current career endeavors.

5.4 Theoretical Implications

Despite the increasing adoption of VR, little is known about what could drive potential VR gamers to play VR sports games, and why some individuals hesitate to use it. The current study extends research on VR by exploring the potential motives for, and perceived barriers to, playing VR sports games. The researchers conducted focused group interviews to analyze the potential VR gamers' interest in engaging in VR sports games, and their unwillingness to participate in VR games. Technology/media use has hitherto been explained by theories of motivation such as the SDT, the U&G and more recently the SVGMS. Technology has evolved from 2D videos to 3Ds, and VR introduces a 3D, 360 degrees immersive experience, while this technological advancement is not completely explained by the extant theories. While relying on these, therefore, as building blocks, this study is a necessary next step in trying to explain what motivates VR use. This is because to date, there has been, to our knowledge, very little research on the drivers of interest or motivation in playing VR sports games, knowledge of which can be applied to other VR game plays.

This work thus extends previous media-related motivational theories by introducing novel aspects that explain why individuals play VR games. These findings are consistent with research on motivational pull of video games (Ryan et al., 2006) and the SDT (Deci & Ryan, 2008; Ryan & Deci, 2008), as participants expressed excitement that the new format (i.e., VR) of playing sport video games is a major motive for engaging in the activity. This finding suggests that people may purchase VR game products out of a desire for novelty. Considering that the study participants did not play the VR game prior to the focus group, and that many did not have prior VR experience, the *interest* measured here could be akin to potential motive for engaging" with VR. In this case, it is possible that some of the significant factors here may become less salient as the participants become more familiar with VR. For this reason, the present study contributes to our understanding of how to get people interested in engaging with a new, unfamiliar technology. On the one hand, the findings on the role played by novelty, skepticism on the quality and financial perceived constraint may not be persistent. Considering the current technological advancement and the growth of the VR video gaming market, it is reasonable to speculate the following trends in the future: (1) The novelty will wear out. (2) VR game quality will improve. and (3) VR equipment and software should become more affordable. On the other hand, the other findings related to realism, simulation, sports knowledge, lack of time, limited social interaction, and in the case

of sports games, preference for the actual game, may be more enduring.

The findings here also suggest video gamers are willing to play VR sports games because they are able to mimic their favorite players' skills and also experience a feeling of realism. These findings are consistent with the SDT-based research, which demonstrates that activities foster greater intrinsic motivation to the extent to which they satisfy three of the fundamental human needs, specifically the need for competence, autonomy, and relatedness (Przybylski et al., 2010). Therefore, it is reasonable to postulate that VR games help video gamers develop their competence as they play games with hopes that they can apply the knowledge to actual sports participation.

Another theoretically plausible explanation for the findings includes the U&G paradigm. Some of the motives for playing video games identified by research include challenge and high-quality graphics (Sherry et al., 2006). We found that the graphics in VR games appeal to video gamers as they indicated that the better the game looks, the more real it felt. Playing may also help individuals develop skills in actual sports participation, which relates to the challenge motive found in the research on U&G. This study further adds to the body of literature on motives for playing VR games by suggesting that natural control, simulation, sport knowledge and spatial presence form additional motivation- beyond challenge, control, and interactivity (Huang & Hsieh, 2011) that can explain why individuals are willing to play VR games.

According to the U&G paradigm, social interaction was the main reason for playing video games, such as interaction with friends. This paradigm does not find a perfect parallel replication in VR sports games, as the findings of this study place more emphasis on "simulation" and "sports knowledge" as motives. These new factors highlight utilitarian motives beyond the social interactions previously postulated by the U&G. Therefore, the factors found important in the present study may contribute to expanding the application of the U&G, especially as applied to VR games, and even more so to VR sports video games.

Simulation and sports knowledge suggest that what individuals learn in the real world (e.g., skills, attitudes) can be called upon and deployed in the virtual world. Although these 'worlds' are distinct, this transfer of learning across them is partly a function of the identification and blurring of the boundary between these realities (real vs. virtual). This can also serve as a model for the opposite transfer of knowledge and learning from the virtual unto the real world. This model will make VR sports games useful as a learning/training platform with its growing use in sports. These findings are in line with the findings from Kim and Ross (2006), which identified entertainment, identification with sport, knowledge application, fantasy, competition, social interaction, and diversion as the seven dimensions of sport video game playing motivations. As found in the present study, players may be keen to apply knowledge and skills learned in the real world to a virtual world. They may also be desirous of confirming the validity and hence usefulness of knowledge learned by 'testing' it in a safe, virtual environment– a safe validation of learned knowledge be-

fore applying it back to real events. To this end, apart from the knowledge transfer, another reason for using VR sports games may be the comfort and safety offered by a virtual environment, to practice what one has learned, without judgment, with tension and without fear of failure. In summary, this study contributes an extension to the U&G to include a learning, practice, and demonstration model.

In terms of the actual game design and the mechanics of play, the investigators found that participants are reluctant to play due to functional risks, limited space for some sports, limited social interactions, and preference for actual sport participation. These findings are consistent with research on participants' motivation to discontinue playing video games due to technical difficulties with the videogame: the need for a computer and space to play the game, dull music, and boredom (Paw et al., 2008).

5.5 Practical Implications

As the current media and marketing environment faces new technologies and paradigms, many organizations confront changing consumer behavior so that they can better reposition the organization in a marketplace. New technology like VR, and its application to the sport industry is certainly presenting practical implications to be noted.

For sports organizations, a virtual experience is not a novel concept anymore as sport organizations have been using it in different ways, such as virtual stadium tours. Similarly, it is possible that VR sports games could serve as a supplement and substitute, in some cases, to strengthen the value of actual sports game experience (Seo, 2013). Kim et al. (2015) found traditional sports video games could create another point of connection with both existing and prospective consumers as sports video games could generate positive emotions and cognition toward the sports league. It is speculated that VR sports games could serve a similar role. For instance, VR ski games could create year-long virtual engagement with consumers without any geographical barriers and with less financial burden.

Also, creating additional sources of revenue will be feasible for both sport organizations and VR game developers/publishers by developing virtual signage or inserting signage in the equipment. Riot Games developed an in-game digital signage for The League of Legend esports, and Mastercard became the first in-game digital sponsor. It is very possible to see further opportunities for maximizing revenue in sport VR games. Therefore, sports organizations may want to think about further strategic ways to take advantage of VR sports games for their business innovation through cross-industry collaboration.

More specifically, one of the aspects that uniquely separate VR sports games from traditional sports video games are the virtual experience features based on realism presented in the VR sports games. This study supports the notion that realism (natural control, graphics, and spatial presence) is one of the most salient prospective motives for playing VR sports games. Therefore, one obvious practical implication for VR sports games companies is that VR game developers should focus on how to further enhance realism of the games, thus, anticipated virtual experience based on quality realism can be provided to VR

sport video gamers. That is to say, the application of mimicking sports elements in a realistic digital space setting will serve as an influential motivation for potential users. The application should be based on a balanced combination of authentic sport elements and interactive simulation available for gamers.

One notable barrier this study identified is skepticism on quality. Skepticism stemmed from two reasons based on the interviews of this study. Firstly, the participants exhibited reluctance to be a risk taker by purchasing VR sports games as VR equipment and VR games are perceived to be in an introduction stage in a life cycle. Secondly, the skepticism on quality indicates the skepticism as it relates to the cost of VR equipment, rather than VR itself. In other words, none of the participants pinpointed technology quality. What it means to VR sports game companies is that they should implement strategies that will promote the realism of VR sports games while overcoming skepticism simultaneously. Providing a trial opportunity to directly experience VR sports games, for instance, at sporting events, might be an effective method to overcome skepticism. Also, creating VR sports game tournaments where potential users can directly experience in a friendly environment with a gaming community would develop a positive VR experience. VR sports game tournaments could also promote a sense of belonging to a gaming community and generate social interaction among other gamers. Additionally, by doing so, VR sports games will be visibly present in a marketplace, which might lead to potential sales increases; as a result, purchasing costs results could be lowered for buyers.

6.Limitations and Future Research

This study has a few important limitations to be noted. First of all, all the participants in this study did not have previous VR sports games experience, but the majority did have some traditional gaming experience and an interest in sports. It is safe to assume that those who have previous VR gaming experience (either positive or negative) may present different sets of interests as well as barriers. Accordingly, future research may want to examine how previous VR sports games experience presents similar or dissimilar results of interests and barriers. Secondly, yet similarly, this study recruited students for focus group interviews. Whereas there are strong justifications for using students, it is suggested interviews should include a wide range of potential VR sports games users to capture more comprehensive answers for the research question. For example, it is assumed that those who graduated from college, are interested in up-to-date VR technology, and have disposable income would provide different perspectives in understanding VR sports games users.

While this study was exploratory in nature, future research might want to extend current understanding of effects of VR sports games. For instance, Kim et al. (2015) found that repeated exposure to unfamiliar sport games led to positive emotional responses to and cognitive evaluations toward brands embedded in the sport video games. It would be interesting to examine if repeated exposure to VR sports games presents similar results that Kim et al. found.

Findings from this study also open up several

avenues for future theoretical explorations. For instance, the insights on how players transfer sports knowledge from the real world into a VR sports game, and hence the implications on learning theories, may open the way to explorations on personality. For example, future studies can examine to what extent the personality trait of openness to experience affects one's desire to learn, either from the VR environment, or from the real world, with the intent to transfer such knowledge in the opposite direction.

Additionally, from a macro-perspective, although much is known about sport video games in sport management and other academically associated literature, empirical research about VR sports games is still completely lacking. Therefore, future research may want to explore further various applications of VR sports games as it relates to the practice of sport marketing. For instance, how the virtual VR sports games experience will affect actual sport consumption behavior or how the use of VR sports games for sport marketing affects organization's overall marketing campaigns will be interesting points of discussion for future research.

7.Conclusion

There is no doubt that the sports industry is paying close attention to VR offerings in order to stay competitive in the modern sport business environment. The authors believe that VR sports games could serve as a strategic vehicle for organizations to support their digital transformation process. Furthermore, VR sports games could serve as additional supplemental and substitutional content for a wide range of sport consumers. This study identified both potential motives as well as perceived barriers to use VR sports games. This study argues that these findings have important theoretical and practical implications that have to be further explored.

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