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Research Article

eSports Participation among Hong Kong Middle-Aged and Older Adults: A Qualitative Study

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The HK Special Administrative Region Government has been making efforts to promote active aging among older adults. This qualitative study is aimed at gaining an understanding of the perception of and experiences in eSports among middle-aged and older adults in HK, China, using the Theory of Planned Behavior. Thirty-nine adults aged >45 years were stratified by (a) whether they had experience of participating in eSports and (b) age (i.e., 45–64 years vs. ≥65 years). In addition, 10 administrators working in community centres for middle-aged and older adults were invited for a semistructured interview. The results revealed the pertinent themes of (a) behavioral beliefs (physical benefits (enhanced physical activity levels, body coordination, and cognition), social benefits (increased interactions and team communication and enlarged social circle), psychological benefits (stereotype breaking, sense of recognition, enjoyment, and improved mood), and adverse health effects (psychological intensity, frustration, obsession with winning, overuse strain, and sleep disturbance)), (b) normative beliefs (support and encouragement from family and nonfamily members), and (c) control beliefs (game content, program personnel attitude, resource availability (venue, equipment, and manpower), administrators' perspectives, and support from the industry). The study results will be instrumental to the development of related interventions and instruments for middle-aged and older adults, will enable researchers to explore the benefits of eSports programs for the studied population, and will promote healthy and active aging in the long term.

1. Introduction

In Hong Kong (HK), China, the number of individuals aged ≥65 years is estimated to increase from 1.27 million (17.9%) in 2018 to 2.62 million (34.6%) in 2048 [1] Thus, because of the increasing aging population and its social implications, the HK Special Administrative Region (HKSAR) Government has been making efforts to promote active aging among older adults. The life course approach [2] that is based on life cycle theory [3] recommends that active aging should be promoted for both older and middle-aged adults (aged ≥ 45 years) once their functional capacity begins to decline [4]. In recent years, the HKSAR Government has focused on gerontechnology, which is "the study of technology for ensuring good health, full social participation, and independent living throughout the entire life span" [5].

The Innovation and Technology Bureau has launched various programs for promoting the development of innovative technologies for health care for older individuals, such as the Innovation and Technology Fund for Application in Elderly and Rehabilitation Care. In the policy address of 2017-2018, the HKSAR Government described electronic sports (eSports) as "a new sector with economic development potential" and allocated HK$100 million to Cyberport to promote eSports venue and technological development. Kane and Spradley [6] and Taylor [7] have defined eSports as video games played in an institutionalized competitive setting wherein players compete for prizes. In 2018 and 2019, some eSports activities were conducted in HK for older adults, including the eSports exchange activity organized by the Acer and Senior Citizen Home Safety Association in 2018. As indicated in many press releases (e.g.,

Cyberport [8]), older participants believed that their participation in eSports can enhance their health and boost the relationships with their grandchildren and family.

Reitman et al. [9] reviewed recent studies on eSports and indicated that research on eSports is still in its nascency. Many existing studies on eSports have mainly focused on teenagers, with studies on middle-aged and older adults lacking. Moreover, compared with the number of studies on video games, fewer studies have focused on this newly evolved competitive gaming context (eSports). Scholars have identified various gaps in research on eSports [10–13] including the lack of studies examining (a) factors related to participation in eSports, such as the determinants or motivation of participation, among players of various ages (e.g., older adults) and (b) identifying factors, psychological or physiological, that facilitate or impede healthy behaviors in amateur participants (e.g., amateur older players). In HK, Leung et al. [14] were the first to examine the public's (1556 adults aged ≥ 18 years) understanding of and perceptions regarding eSports. The authors reported that 60% of the 292 randomly interviewed older adults aged ≥ 65 years (out of 1556 participants) supported government funding for eSports development in HK.

Various models or theories have been adopted to explain behavioral intention and technology use, including the Technology Acceptance Model (TAM) [15], Unified Theory of Acceptance and Use of Technology (UTAUT) [16], Self-Determination Theory (SDT) [17], and Theory of Planned Behavior (TPB) [18]. Some of them have been applied to investigate gaming in older adults, including the TAM [15], UTAUT [16], SDT [17], and TPB [14, 19, 20]. The TPB explains how individuals' attitudes and beliefs regarding behavior, subjective norm, and perceived control affect their participation in health-relevant behaviors [21]. In particular, individuals' intention to perform a behavior is determined by their subjective norm associated with, perceived control over, and attitude toward the behavior; these factors are, respectively, affected by their salient beliefs, namely, behavioral, normative, and control beliefs. Behavioral beliefs refer to individuals' beliefs regarding the results from performing a behavior (such as the beneficial effects of playing eSports). Normative beliefs refer to a crucial referent's approval or disapproval of performing a behavior (such as spousal approval). Control beliefs refer to the presence or absence of facilitators and barriers to behavioral performance. In 2021, Wong et al. [22] were the first to investigate the perceptions of 25 young adults aged between 15 and 29 years regarding eSports development and engagement by using the TPB. The authors reported that the interviewees perceived the beneficial and deleterious outcomes (e.g., goal setting and achievement, academics and time distribution, physical strain, and negative social image,), subjective norms (e.g., parents, peers, and teachers), and barriers and facilitators (e.g., balance between academics and eSports, career prospects, and future reality) of participating in eSports. In a qualitative study involving 25 secondary and university students with experience in eSports competitions, an eSports Intention Questionnaire with questions modelling on the constructs of TPB (e.g., to measure participants' attitudes,

subjective norms, and perceived behavioral control) was designed. The psychometric properties of these measurements (i.e., constructs of TPB) were found to be reliable (Cronbach's α = .90 in average) and valid by yielding satisfactory goodness of fit indices, using confirmatory factor analysis [22]. Given the promotion of active aging by the HKSAR Government and based on the gaps identified in research on eSports, this qualitative study examined the perception regarding and experiences in eSports among middle-aged and older adults in HK, China, based on the TPB.

2. Materials and Methods

2.1. Participants. In this study, we enrolled 39 participants aged ≥ 45 years and 10 administrators working in community centres for older individuals as our study participants. All the participants were recruited through purposive sampling and were stratified by (a) age (middle-aged adults aged 45–64 years vs. older adults aged ≥ 65 years) and (b) whether participants participated in eSports before. The inclusion criteria were as follows: (a) age ≥ 45 years, (b) no diagnosis of cognitive impairment, and (c) ability to communicate in Chinese. The Abbreviated Mental Test (AMT) [23] was used to examine the participants' cognitive function. The participants with a score of <6 in the AMT were excluded from this study. During the study period, no interviewee rejected participating in our interview.

2.2. Procedures. Conducted between March and June 2021, all research activities were reviewed and approved by the University Research Ethics Committee (approval number: 2019-2020-0300). The study purpose was provided to targeted community centres for older individuals in HK. With the consent of the centre-in-charge (CIC), the project team enrolled participants through recruitment talks and advertisements in targeted centres. Enrolled participants were further provided with study information and invited to individual semistructured interviews. The CIC arranged the interview with the participants in their centres. On the interview day, we screened the participants for eligibility by administering the AMT and obtained their informed consent. We informed the participants regarding the confidentiality of the study findings and their ability to withdraw from this study at any time. The participants were asked to (a) share their beliefs and experiences regarding eSports, (b) provide insights into the factors that affect participation in eSports, and (c) express their opinion and suggestion regarding possible eSports interventions for middle-aged and older adults. Interviews lasted for approximately 60 minutes on average. No repeat interview was performed.

2.3. Semistructured Interview. Semistructured interviews were conducted using a standard set of questions based on the literature on eSports and the TPB [21] (see sample interview questions in the appendix). The participants were asked regarding the three main constructs of the TPB: attitude toward eSports and its salient beliefs (behavioral beliefs), subjective norm and its salient beliefs (normative beliefs), and perceived behavioral control and its salient beliefs

(control beliefs). A pilot test of the standard set of questions was conducted among five middle-aged and older adults. Adopting a flexible approach and, when necessary, asking some probing questions to facilitate in-depth conversations, all interviews were audiotaped and conducted by the female principal investigator and male trained research assistant who had experience in conducting qualitative interviews and had no prior relationship with the interviewees. During the interview, observational notes were recorded to enhance the accuracy of transcripts and data analysis. We provided a supermarket voucher worth HK$100 to the participants to acknowledge their contribution to the study.

2.4. Data Analysis. All interviews were transcribed verbatim and verified. Personal details were removed to maintain anonymity. To improve the trustworthiness of the analysis, respondent checks were performed to confirm the participants' experiences. We randomly asked two respondents if they agreed to review the manuscript. With their consent, manuscript was sent to them and they reviewed and confirmed the results. Other than asking respondents to review our results, transcripts were read multiple times until the research team was familiar with the content; the team then adopted a deductive thematic approach for coding. Data were organized into conceptual themes under the constructs of the TPB. Coding was an iterative process and through discussion among the researchers to obtain significant themes from the raw data. Two coders read, reread, and coded a portion of transcripts independently (i.e., data triangulation) to ensure that coding was accurately performed in accordance with the research questions. Subsequently, the coded transcripts were compared and discussed among the coders again. Any differences in coding were resolved through discussion with the principal investigator and alteration of codes. Additional discussion was conducted within the research team to reach a consensus on significant themes and to maintain analytical rigor. All these would help avoiding researcher bias. During the iterative process, data saturation was considered to be attained when new descriptive codes or topics could not be determined. The 32-point consolidated criteria for reporting qualitative studies [24] were used to report the results.

3. Results

Forty-nine interviews with 10 administrators (3 from public and 7 from private community centres for older individuals) and 39 participants (15 middle-aged and 24 older adults) with and without eSports experience were conducted. Among the middle-aged and older adults (17 from two private and 22 from two public centres), 69% ($n = 27$) were women, and 49% ($n = 19$) had experience of participating in eSports. Among the 10 administrators, 60% ($n = 6$) were women, and 90% ($n = 9$) had a tertiary or above educational level. Table 1 summarizes the interviewees' characteristics.

3.1. Behavioral Beliefs

3.1.1. Physical Benefits. The respondents believed that eSports, especially exergaming, can motivate older adults to

TABLE 1: Sociodemographic characteristics of participants and administrators.

	Participants with eSports experience	Participants without eSports experience	Administrators
Age			
18-27	0	0	5
28-37	0	0	3
38-47	0	0	2
50-54	0	2	0
55-59	2	2	0
60-64	3	6	0
65-69	4	2	0
70-74	4	3	0
75-79	4	3	0
80-84	2	1	0
85-89	0	1	0
	19	20	10
Gender			
Female	16	11	4
Male	3	9	6
Occupation			
Full time	0	1	10
Search for job	0	1	0
Retired	18	16	0
Part-time job	1	2	0
Education level			
Primary	5	5	0
Secondary	7	13	1
Tertiary	5	2	7
Master and above	0	0	2
Uneducated	2	0	0
Monthly family income (HK$)			
Nil	6	9	
Below 20000	9	6	
20000-30000	1	1	This question was not asked
30000-40000	2	3	
40000-50000	1	1	
Estate/organization type			
Public	6	7	2
Private	7	4	8
Home ownership scheme (HOS)	6	9	0

participate in physical activity (PA) and improve their body coordination and cognitive ability.

(1) Enhance the PA Level. One administrator (FA1) stated that *I think exergaming can encourage them to engage in physical activities such as e-swimming…. Their responses to our trial run were overwhelming… Their dedication to playing exceeded our expectations…*

(2) Body Coordination. Another administrator (MA5) shared the following:

We asked participants whether they experienced any improvement in the agility of their fingers and hand–eye coordination after joining our eSports program. They replied that the manner in which they held chopsticks, played on cell phones, and used a mouse was different and improved…it requires the skill of blind touching and manipulating the four directional keys without seeing the keyboard….

This benefit was echoed by another administrator (MA3) as follows: *Sustained engagement in exergaming led to an improvement in balance and thus reduced the risk of falls.*

(3) Cognition. One participant (FP2) elaborated the importance of the reaction time when playing eSports as follows: *In general, older adults are slow in …motion. Winning an eSports game requires us to act (to attack) and react (to avoid being attacked) fast and strategically…* Another participant (FP5) indicated the following: *eSports can enhance the memory of older adults…*

3.1.2. Psychological Benefits. The novelty of eSports attracted the participants who believed that playing eSports can break the stereotype that older adults are not fit for playing such games. Engaging in eSports can provide older adults with recognition and enjoyment and improve their negative mood.

(1) Stereotype Breaking. One participant (FP8) indicated that *Playing eSports enables me to know more and communicate with youngsters on trending topics.… Some young individuals are surprised to know that we… also play eSports. They said to me, Wow! You play eSports too!*

(2) Sense of Recognition. Another participant (FP3) shared her memorable experience that she was proud of as follows:

After the eSports competition, I was interviewed by a news channel. My son then said to his friends that my mum also plays eSports. My neighbors asked me whether I was on TV yesterday. My previous students got the news from Facebook and said that our head teacher plays eSports too…

(3) Enjoyment and Improving Negative Mood. One administrator (MA3) stated as follows: *I found it meaningful to bring happiness to older adults through eSports that enables participants to have fun.* Another female participant (FP4) indicated the following: *eSports such as exergaming reduces depressive symptoms and enhances mood. Focusing on winning a game can increase the endorphin level.*

3.1.3. Social Benefits. The respondents indicated that eSports can enhance interactions with peers, family members, and youngsters, improve team communication, and enlarge the social circle.

(1) Increased Interaction with Peers, Family Members, and Youngsters. One administrator (FA1) stated as follows: *I observed that increased interactions among peers provides them with a platform to communicate pleasantly with peers…*

One participant (FP3) shared the following: *Playing with young people became common and facilitates talking with them… I play with my son and grandchild pleasantly online even though we stay in different cities.*

Another participant (FP4) recalled the following:

Two years ago, I went to a fast-food shop where I met two young people playing e-games. They asked me whether I play e-games too. I replied that I am learning to play e-games and loving it ……They asked me what games I played…With this common talking point, I made the first step into the world of young people…

(2) Team Communication. One administrator (MA2) indicated that *We have games for a three-member team to play. It necessitates team members to communicate with each other on which roles to play and how to play it…*

(3) Enlarged Social Circle. One administrator (FA4) commented that

…the group of older adults whom I am now inviting to come to play are old members. They know each other well.……Now that our centre has purchased one more set of Switch, we will continue to promote exergaming …… to new members so that they can play together with old members…

3.1.4. Adverse Effects. Sustained playing and training in eSports can result in psychological (e.g., psychological intensity, frustration, and obsession with winning) and physiological (e.g., overuse strain and sleep disturbance) adverse effects.

(1) Psychological Intensity. An administrator (MA3) was worried that *older adults may not be able to sustain the psychological intensity of eSports training and competition….*

(2) Frustration. One administrator (FA4) commented that *some were frustrated at not knowing how to set up the equipment and after losing a game…*

(3) Obsession with Winning. A participant (MP1) commented that *Some older adults…are so obsessed with winning that they indulge in playing restlessly….*

(4) Overuse Strain (Eyes, Hands, and Wrists) and Sleep Disturbance. A participant (FP4) indicated that *Repetitive movements would lead to overuse strain on your fingers and wrists and even trigger finger. Prolonged screen exposure can lead to eye problems.* Another participant (FP2) indicated her concern regarding sleep as follows: *…I used to practice playing before bed time. I felt nervous and suffered from sleep disturbance.*

3.2. Normative Beliefs

3.2.1. Encouragement from Family Members. Regarding encouragement from family members (such as son and

daughter, grandson, nephew, brother, and sister), three participants reported the following:

My son and grand kid approve of me playing more with my friends… (Participant FP10)

Instead of she teaching me how to play e-games, my daughter encourages me to play e-games at the community centre downstairs, which is good for emotional relief… (Participant FP1)

……Once, my nephew, little brother, and sister visited me. They were so surprised to see the silver and bronze medals I won from eSports competitions. They exclaimed that it was good for me… Laughing at me, my nephew remarked that I should have won the championship…His saying motivates me to do better…Last year, I made it. I told my nephew that I won the championship… (Participant FP7)

3.2.2. Encouragement from Nonfamily Members. Nonfamily members' support includes peers (such as peer neighbors and minimovie director).

One participant stated the following:

My friends support and encourage each other to play eSports. Encouragement from a friend is important to push you to try new things. I encourage others to keep abreast with time… (Participant FP2)

Other participants were encouraged by neighbors and a minimovie director and stated the following:

I was invited by my neighbors to come and play… (Participant FP14)

The mini-movie director is so nice that he organized 10 training sessions for us. I attended 8 sessions…not for wining a prize but for playing happily together with others… (Participant FP3)

3.3. Control Beliefs. The respondents considered the content of the game, the attitude of program personnel, the availability of resources (venue, professional equipment, and manpower), the perspectives of administrators, and the support from the industry as key factors that facilitated or inhibited their participation in eSports.

3.3.1. Game Contents. Easy-to-play, motion-based games such as car or horse racing that are suitable for multiple generations were preferred over violent games. The participants stated the following:

We should choose some interesting, easy-to-play games for older adults (like car or horse racing).…In particular, female players prefer cute and simple games over those with blood and violence. Complicated games are difficult to comprehend… (Participant FP12)

I like games suitable for multiple generations… Generation gap is a social and family problem. We must do something to solve the problem and foster relationship and harmony… (Participant FP3)

3.3.2. Program Personnel Attitude. The program personnel attitude includes patience, kindness, and motivation.

Participant (FP13) expressed that *Because our receptive ability and responsiveness are relatively low, program instructors are so kind and teach us patiently. We have developed a good relationship. I am very happy to play eSports.*

Participant FP3 was inspired by an instructor: *He (instructor) once said how can you persuade others if you yourself know nothing.… This inspires me that eSports is not all talk and no action. You got to learn it hard…He is my mentor…*

Poor personnel attitude caused another participant (FP9) to drop out: *I dropped out after playing for two sessions because I was given a cold shoulder by the staff. I feel bad. Not all young staff understand how to deal with older adults… Staff attitude is really essential…*

3.3.3. Availability of Resources

(1) Venue: A Spacious and Nearby Community Centre. A participant shared her pleasant eSports experience: *Our first eSports competition was held in a big hall with onlookers. I found that the atmosphere was really good…* (Participant FP15). Another participant stated that *I prefer playing in a nearby community centre with which I am familiar…* (Participant FP13).

(2) Equipment and Devices: Professional Equipment and Bigger Screen Preferred. Participant (FP7) preferred a bigger screen as per the following statement: *A cell phone is too small for older adults to play with. Because our eyesight is poor, tablets with bigger screens are easier for us to manipulate…*

Another participant (FP8) remarked that professional equipment was required to play well as follows: *Your home computer, keyboard, mouse, and headphone must support playing eSport if you aim high…*

(3) Manpower. The availability of supporting staff is critical to promote centre-based eSports for older adults.

Most importantly, we need program instructors and facilities. Previously, we played with three supporting staff members. They have left… (Participant MP1)

The availability of manpower with required skills is essential for setting up facilities and teaching older adults how to play… (Administrator FA1)

3.3.4. Perspectives of Administrators. The positive perspectives of administrators facilitate the organization of and their members' initiative in joining eSports activities.

I found it meaningful to bring happiness to older adults through eSports, which is not merely playing video games but enabling them to have fun while playing (Administrator MA3)

I felt that the program enabled them to try trendy things. The feedback is good. I will carry on (Administrator MA2)

However, administrator MA5 commented the following:

Although the management is positive about my initiative, I receive no direct funding from my centre probably because they think that eSports is merely a gimmick and is still unpopular among older adults. I have to apply for outside funding for the program…
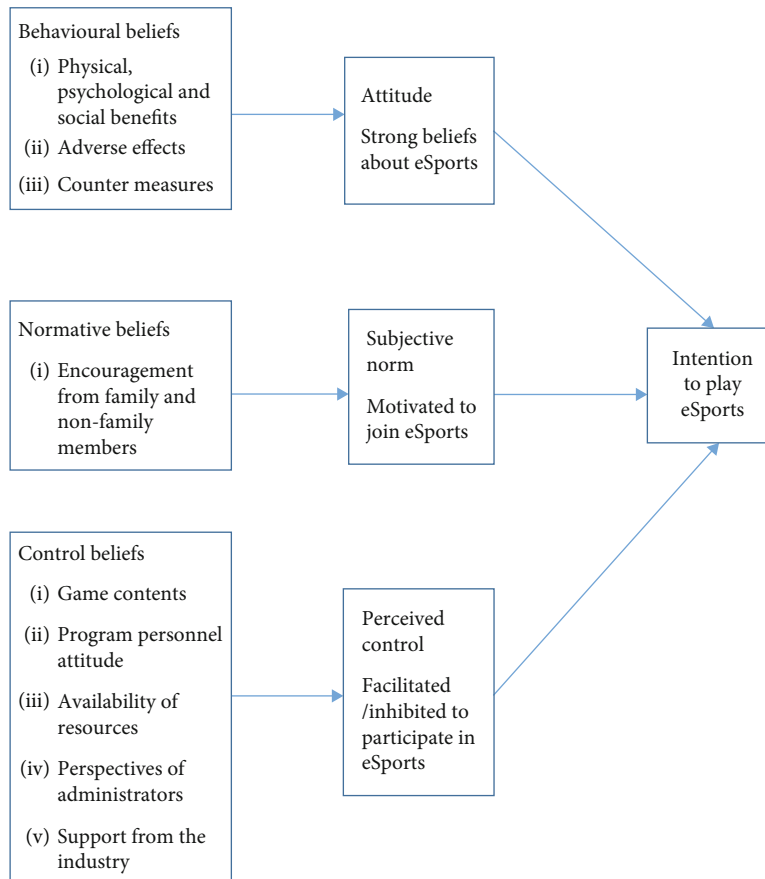
Figure 1: TPB model.

3.3.5. Support from the Industry. One participant MP1 recollected the following: *Various technical support staff and services are required in each competition. The fiber optic service in the previous competition was provided by CSL at a reduced price of $200,000…*

Another participant FP8 shared thankfully that *eSports necessitates professional equipment. You are required to upgrade your home computer to [one with] a eSports level……The initial competition was co-organized with ACER who offered us a staff discount for procuring professional equipment…*

4. Discussion

This qualitative study is aimed at gaining an in-depth understanding of the perception of and experiences in eSports among middle-aged and older adults in HK, China, by using the TPB model. The study results revealed that the respondents believed that eSports would benefit them physically, psychologically, and socially. Moreover, they indicated that sustained playing would exert adverse effects. Some respondents indicated that the disadvantages of playing eSports could be overcome by measures such as self-regulation. The respondents obtained support and encouragement from their family and nonfamily members, and some respondents demonstrated self-control over their participation in eSports. The respondents considered the content of the game, the

attitude of program personnel, the availability of resources, the perspectives of administrators, and the support from the industry as key factors affecting participation in eSports (Figure 1). Because of the lack of studies examining the effects of eSports on middle-aged and older adults, the literature on video game and exergaming was used as a reference in the following discussion.

4.1. Behavioral Beliefs

4.1.1. Physical Benefits. The participants in our study perceived that playing eSports might help increase their PA level, such as through *e-swimming* and *e-car-racing*, which are interactive games that combine exercise and video games. Our results echo the finding of a previous study that enhanced PA was experienced by older adults playing mobile exergames [25]. Unlike when playing other video games, the participants believed that eSports enhanced their body coordination, including brain–eye–hand coordination, because it required acting and reacting by pressing directional keys and the mouse rapidly and strategically. In terms of cognition, playing eSports enhanced the middle-aged and older adults' attentiveness and strategic thinking by motivating them to solve problems or think outside the box while playing games [26]. Moreover, keeping the mind engaged in cognitively demanding activities is essential for enhancing memory function in older adults [27].

4.1.2. Psychological Benefits. Among the factors motivating young adults to play eSports (novelty, escapism, aesthetic, and achievement) [28], the respondents in our study were driven by novelty and curiosity. They regarded trying something new (eSports) as a stereotype-breaking (eSports is not suitable for older adults but youngsters), self-affirmative, and enjoyable (happiness and fun) process. Previous studies [29, 30] have indicated that older adults are often stereotyped as having a lower level of technological competence than do younger individuals. Köttl et al. [29] regarded this stereotype as a barrier to technology acceptance and usage in late adulthood. Our participants perceived that eSports not only improved their cognition but also increased their sense of accomplishment upon winning a game that was difficult to learn and master. These findings are in line with those reported by Jung et al. [31], who indicated that participating in exergames improved self-esteem and reduced negative moods, such as loneliness, in older adults. Some participants in our study expressed a sense of accomplishment after being recognized by their family members, neighbors, and previous students on TV and Facebook and receiving satisfactory feedback from them. Similarly, Carbonie et al. [32] and Johnston et al. [33] have demonstrated that participating in eSports can enable individuals to achieve personal standards and goals and gain a sense of achievement from showcasing their competence in eSports.

4.1.3. Social Benefits. Hausknecht et al. [34] reported that participants' level of social connectedness increased and loneliness declined after an exergaming tournament. The respondents in our study shared similar perceptions and experiences that eSports enlarged their social circle (playing with old friends and getting acquainted with new friends); enhanced interactions and connections with peers (team spirit), youngsters, and family members; and produced positive emotions for both generations, which is instrumental to intergenerational communion. Our findings are in line with those reported by Osmanovic and Pecchioni [35], who indicated that playing video games with family members fosters intergenerational relationships. Cacciata et al. [36] demonstrated that exergaming may increase PA among older adults playing such games with peers or family members due to increased social interaction and fun.

4.1.4. Adverse Effects

(1) Psychological Effects. A previous study reported that older adults' participation in exergaming was inhibited by their lack of confidence in adapting to new routines and the higher level of exertion resulting from higher cardiovascular activity, which caused anxiety and insecurity [37]. Similarly, our study demonstrated that some players felt frustrated upon not knowing how to set up equipment and upon losing a game. Some administrators expressed their concern that members might not be able to sustain the psychological intensity of eSports training and competition and that inferior players might feel incompetent and lack confidence.

(2) Behavioral and Physiological Effects. Behavioral hazards in video gaming include addictive tendencies [38], unhealthy sleep habits, and prioritization over essential daily life activities [39]. Our study revealed that obsession with winning would lead to increased playing and prioritization over household activities (e.g., preparing meals) at the expense of other interests (e.g., volunteering and learning). When playing before bed time, one participant (FP2) felt nervous and experienced sleep disturbance. In terms of physiological and cognitive challenges (e.g., physical fatigue and difficulty in memorizing correct steps and routines) [37], some participants indicated that repetitive movements led to overuse strain on the fingers and wrists and could even trigger finger.

4.2. Normative Beliefs

4.2.1. Encouragement from Family and Nonfamily Members. In this study, one participant was motivated by the nephew, younger brother, and sister to win a gold medal after winning silver and bronze medals in eSports competitions. Playing eSports can produce positive emotions among generations [35]. Some individuals were encouraged by nonfamily members (friends) to try new things, were invited by neighbors to play trendy eSports, and were inspired by a minimovie director who organized 10 eSports training sessions for them. These findings are in agreement with those reported by Boot et al. [40] that older adults received support in cooperative or multiplayer game mode would demonstrate greater intervention adherence.

4.3. Control Beliefs

4.3.1. Game Contents. Barg-Walkow et al. [41] reported that most exergame programs were not designed considering the older adult population, suggesting the need to reduce the complexity of the game content. For all the components of a game (e.g., game mechanics, aesthetics, narratives, content, and characters) [42], game design must be adaptable to the conditions of the target group [43]. In our study, interesting and simple motion-based games were preferred by the older adults over war games and those involving violence, blood, killing, and horror. Some adults preferred games suitable for multiple generations (for fostering relationship and harmony). They experienced difficulty in tackling the complicated on-screen interfaces of complex games, such as PUBG, in which they were easily shot dead because of slower movements and dizziness.

4.3.2. Program Personnel Attitude. Although the older adults had strong behavioral intention to participate in eSports, they lacked the skill and knowledge to perform the behavior. Therefore, effective instruction and guidance from a patient, kind, and inspiring instructor is critical to older adults using game systems and to increase older adults' confidence in playing videogames on their own [41, 44].

4.3.3. Perspectives of Administrators and Availability of Resources. Baert et al. [45] demonstrated that administrators play a key role in developing the care policy of long-term care facilities. In our study, the administrators played a key

role in developing leisure and physical activities within their community centres. The study results revealed that they generally supported and initiated centre-based eSports programs because eSports is a pleasant and trendy option for older adults. However, as indicated by Baert et al. [45] and Benjamin et al. [46], centre-based programs are subject to the availability of funds (requiring direct funding for running an eSports program and purchasing necessary equipment and software), space (many other activities are conducted in the community centres), and manpower with the required skills (essential for setting up facilities and teaching older adults how to play). The stereotype that eSports is merely a gimmick and is still unpopular among older adults affects the CIC's decision to provide complete support for centre-based eSports programs.

4.3.4. Support from the Industry. Industry support (e.g., provision of technical services and professional equipment at discounted prices) is essential because older adults have little direct income after retirement. In our study, the participants (a) recollected with thankfulness that CSL (a telecommunication company) provided fiber optic service for eSports competitions at a reduced price and (b) remarked that Acer (a computer company) offered them a staff discount to procure professional equipment for upgrading their home-based computers for playing eSports.

5. Strengths and Limitations

To the best of our knowledge, this is the first theory-based qualitative study examining the perspectives of middle-aged and older adults and administrators regarding their participation in eSports in HK, China. Semistructured interviews with a large sample size of 49 respondents in a wide range of age groups (administrators aged 18–47 years, middle-aged adults aged 50–64 years, and older adults aged 65–89 years) provided a rich dataset and enabled data saturation, thus helping to determine their perceptions and experiences in eSports programs. The content of their quotes was analyzed on the basis of TPB constructs to determine their behavioral, normative, and control beliefs. However, this study has some limitations. First, the participants were predominately women (69%). Second, the literature review was restricted to studies published in English, excluding the literature published in the native languages of various countries that have been influential in the development of eSports.

6. Conclusion

The findings of this qualitative study enhance our understanding regarding the perceptions of and experiences in participating in eSports programs among middle-aged and older adults and administrators working in community centres for older individuals in HK, China. The findings revealed not only physical, psychological, and social benefits associated with playing eSports but also potentially adverse effects resulting from addictive playing. This study identified key referents who provided support and encouragement to the participants and provided insights into the key control fac-

tors that facilitate or inhibit the middle-aged and older adults' participation in eSports. The results will be instrumental to the development of related interventions and instruments for middle-aged and older adults, will facilitate a larger-scale quantitative study on how the studied population perceive eSports participation, will enable researchers to explore the benefits of eSports programs for the target population, and will enlighten policymaker in the formulation of strategies to promote healthy and active aging in the long term.

Appendix

A. Sample Interview Questions

A.1 Sample Interview Questions: Participants with eSports Experience. Behavioral beliefs

(i) What do you see as the advantages of participating in eSports program with reference to your latest encounter?

(ii) What do you see as the disadvantages of participating in eSports program with reference to your latest encounter?

(iii) What else comes to mind when you think about participating in eSports program with reference to your latest encounter?

Normative beliefs
When you intend to participate in eSports program, there might be individuals or groups who would think you should or should not perform in eSports program:

(i) Who would approve/support or think you should participate in eSports program with reference to your latest encounter? (Please list the individuals or groups)

(ii) Who would disapprove/be against or think you should not participate in eSports program with reference to your latest encounter? (Please list the individuals or groups)

Control factors

(i) What factors/circumstances would make you easy or enable you to participate in eSports program in your latest encounter? Why?

(ii) What factors/circumstances would make you difficult or obstruct you from participating in eSports program in your latest encounter? Why?

A.2 Sample Interview Questions: Participants without eSports Experience. Behavioral beliefs

(i) What do you see as the advantages of participating in eSports program with reference to your latest experience in watching/hearing about eSports program?

(ii) What do you see as the disadvantages of participating in eSports program with reference to your latest

experience in watching/hearing about eSports program?

(iii) What else comes to mind when you think about participating in eSports program with reference to your latest experience in watching/hearing about eSports program?

Normative beliefs

Assume you intend to participate in eSports program, there might be individuals or groups who would think you should or should not perform in eSports program:

(i) Who would approve/support or think you should participate in eSports program? (Please list the individuals or groups)

(ii) Who would disapprove/be against or think you should not participate in eSports program? (Please list the individuals or groups)

Control factors

(i) Assume you intend to participate in eSports program, what factors/circumstances would make you easy or enable you to participate in eSports program? Why?

(ii) Assume you intend to participate in eSports program, what factors/circumstances would make you difficult or obstruct you from participating? Why?

A.3 Sample Interview Questions: Administrators. Behavioral beliefs

With reference to your latest experience in organizing eSports program for the middle-aged and older adults in Hong Kong:

(i) What do you see as the advantages of their participation in eSports program?

(ii) What do you see as the disadvantages of their participation in eSports program?

(iii) What else comes to mind when you think about organizing eSports program for them?

Normative beliefs

Assume you intend to organize eSports program for the middle-aged and older adults, there might be individuals or groups who would think you should or should not do so:

(i) Who would approve/support or think you should organize eSports program for them? (Please list the individuals or groups)

(ii) Who would disapprove/be against or think you should not organize eSports program for them? (Please list the individuals or groups)

Control factors

(i) Assume you intend to organize eSports program for the middle-aged and older adults, what factors/circumstances would make you easy or enable you to do so? Why?

(ii) Assume you intend to organize eSports program for the middle-aged and older adults, what factors/circumstances would make you difficult or obstruct you from doing so? Why?

Data Availability

The datasets generated and/or analyzed during the current study are not publicly available due to confidentiality commitment made to the participants but are available from the corresponding author on reasonable request.

Conflicts of Interest

The authors declare that they have no conflicts of interest.

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