

A Project entitled

*A Survey Study: Perceived barriers and facilitators to workplace virtual competition participation*

*during COVID-19*

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## Abstract

**Background:** According to World Health Organization, a “healthy workplace” is a smart thing to achieve job success and is possible to promote moderate-to-vigorous intensity physical activity (MVPA) expected to adults. Virtual running competition (VRC) is a way to promote a healthy workplace atmosphere, while the study of this new idea is limited and the view of participants without joining the VRC has not been studied. **Purpose:** This retrospective qualitative case study is (1) to identify the common barriers and facilitators for staff to join the virtual running competition based on Self-Determination Theory (SDT). **Method:** All 12 administrative staff from the Department of Health and Physical Education (HPE) of The Education University of Hong Kong (EdUHK) were invited with 8 staff consented to join in the study. Individual semi-structured interviews about their physical activity level with the use of the International Physical Activity Questionnaire - Short Form (IPAQ-S) and the point of view on VRC with open-ended questions were conducted. **Analysis:** A deductive approach according to the SDT, 3 themes: competence, autonomy and relatedness are used to analyze the barriers or facilitators of interviewees joining VRC. **Findings:** All staff were reported not joining VRC organized by the department. Autonomy in the workplace and relatedness in competition had given the most barriers to joining the VRC. **Significance of study:** Findings were discussed, suggesting practical applications for VRC to be all-rounded, catering to adults' psychological needs for establishing exercise habits in the workplace.

Keywords: Self-determination theory, Virtual Running Competition, Physical Activity, Facilitators and Barriers, COVID-19

## Introduction

Regular physical activities are proven to stay away from noncommunicable diseases and maintaining healthy body weight, also, improve mental health. Suggested by the World Health Organization (WHO) in 2020, adults aged 18-64 years old should perform an average of at least 150 minutes moderate-to-vigorous intensity physical activity per week. Where WHO also stated that physical inactivity would be a risk factor for chronic, non-communicable diseases (“NCDs”). Physical activity meaning to all movement. The word ‘exercise’ is one kind of physical activity, which is planned, framed, repeated and with a purpose. It has different effect on mental health building on different elements, such as competitive versus non-competitive (Spruit et al., 2016). Under document of WHO healthy workplace framework (2010) stated that “healthy workplace” is a smart thing to do for the business to achieve success. With most of the data has shown the successful and competitive companies has provided significant long-term support on employees’ mental and physical health with health promotion.

Moreover, it is important for us to stay active, maintaining the physical exercise routine especially during the COVID-19 pandemic. Scholars from the American College of Sports Science (ACSM) has mentioned that being active could help to deal with the effect of COVID-19 in different ways. As a result, physical activity is

important to keeping us healthy no matter physically or mentally. However, the pandemic has brought us great obstacles in maintaining physical activities, as the Hong Kong government has occasionally suspended all leisure and sports venues, citizens could hardly find a place for exercising (The Government of the Hong Kong Special Administrative Region, 2022). Under the research done by Centre of Health Protection (CHP) in 2020, about one-fifth of the Hong Kong population aged 15 or above reported sitting or reclining for 10 hours or longer every day. According to the Hong Kong Anti-Cancer Society (2020), almost half of the interviewees have decreased their exercise time, as 83% of them were afraid to get infected and 45% of them think there were lack of exercising venue due to lock down while the pandemic was serious. When the pandemic was eased, there were still 15% of the interviewees still showed decrease in exercise frequency or even not exercising. These data have concluded that the pandemic has disturbed Hong Kong adults' exercising habit and most adults are inactive.

The recent years, publics are having more focus on health. Under the pandemic, hiking and running has become the two most popular exercise performed by Hong Kong publics (Leisure and Cultural Services Department, 2021). Recreational running has been a hit since the start of the decade (Janssen et al., 2017). Countries around the world has proposed digital innovation to offer community wise campaign for addressing the problem of physical inactivity in a more attractive way (Legislative Council, 2021), which will also be the way for Hong Kong government to promote physical activity. With the reference to the recent research done by Looyestyn et al. (2018), they concluded that a virtual mode with participants joining Facebook group undertaking the 8-weeks running program would show a significant improve in their moderate to vigorous physical activity. This could help initiate competitive motivation, encourage users when exercising alone and integrating to the use of social network as well (West, 2015). A 'club' or a 'community' could be created to gather other participants to involve in a virtual run competition (VRC), this has been a trend under the COVID-19 pandemic. Virtual run means using the mobile app or online platform to track and record the real running or walking activity (Wattanapisit et al., 2020). Participants can choose their own perspective with time-based goal or a distance-based goal to perform their daily exercise. Participants being the club member, they could read others' running data, posts from the admin and weekly rankings comparing their mileage accumulated.

Self-determination theory (SDT) is a theory to represent the framework of human motivation and articulates the categorization of motivation into intrinsic and varied extrinsic motivation (Centre for Self-Determination Theory, n.d.). Intrinsic motivation may come from the person's satisfaction, feelings of enjoyment towards the event or even for the challenge of the activity. Extrinsic motivation would come from external rewards, or social acceptance (Teixeira et al., 2012). Under the sub-theory in SDT, The Basic Psychological Needs Theory (BNPT)

under sub-theory of SDT stated: an individual's optimal functioning is predicted on autonomy, competence and relatedness (Centre for Self-Determination Theory, n.d.). Autonomy meaning the subject would have experienced volition and willingness to act. When subjects were satisfied with choice, they feel self-endorsed and authentic. Competence meaning subjects' own self efficacy and the ability to finish the task. Relatedness meaning bonding between subjects and environment, significant others. Subjects feel warmth and connect when relatedness has been satisfied. When the three aspects were fulfilled, it was argued to foster the engagement into the activities, also enhancing performance and perseverance as well (Ryan & Deci, 2000). Continued by Ryan and Deci, the three psychological needs have a high value in studying the influence of the mean or method to one's motivation and engagement. Referencing to the research done by Kazak (2018), result showed that when greater level of the 3 basic components of psychological needs are satisfied leads to positive behavioral consequences in carrying our physical activity. According to the research published in 2020, the result showed that the basic psychological needs are crucial to predicts one's exercise adherence (Kang et al., 2020). Therefore, the basic psychological needs theory will be used to be the framework in this study.

“Run2gather” is the local platform offering virtual running competition to Hong Kong publics. This platform has offered different competition with various themes to attract participants. Until now, the platform has accumulated the mileage ran by the participants which could circulate the Earth 2980 times. The first virtual run competition organized by this platform was back in 2018. The founder of the platform, Joey Cheung think that virtual run can provide new runners to have a try in running competition without having the burden in the competitive atmosphere of authentic competitions. While the HKSAR has planned to address the physical inactivity among youth and adults by 2025, with digital innovation one of the measures (Legislative Council, 2021). The VRC could be a potential mean for HKSAR to promote active lifestyle and healthy workplace. In October 2021, to promote exercise during COVID-19, a VRC has been introduced to the Education University of Hong Kong (EdUHK), all students and staff were invited to participate in the VRC. This study focused on Health and Physical Department (HPE) administrative staff from EdUHK, while all subjects knew the competition but still decided not to join. Taking Looyestyn et al. (2018) and Wattanapisit et al. (2020) research as example, most of the recent research are focusing on the effectiveness of virtual run competition and subjects were all the participants of the VRC, the area of psychological support from the competition to the participants without joining VRC have not been clarified. Thus, further research is needed to address the psychological needs of adults. The goals of this study are (1) to determine HPE administrative staff's physical activity level, and (2) to study the facilitators or barriers of HPE administrative staff to join or not to join VRC. SDT will be the framework to analysis how could the virtual running campaign to work on the goal in 2025 in a more effective way, on knowing how to cater the basic psychological needs for adults in workplace.

# Methodology

## Study design

A cross sectional mix-method design has been conducted. Interview in qualitative research is needed for standing at subject's point of view to see the world, to reveal their experience and meanings, and to discover their daily life prior to scientific explanation (Kvale, 1996). This study design is based on the deductive realist thematic approach, where participants' motivations and meanings are shared in a straightforward way and being analyzed to address the basic psychological needs of the participants in VRC (Braun & Clarke, 2006). A case of the administrative employees of the Department of the Health and Physical Education at the Education University of Hong Kong on carrying out physical activity was invited to participate in this study.

## Procedure

This research has been approved by the Human Research Ethics Committee of the Education University of Hong Kong. Arrangement of the participant recruitment and all interviews were conducted by the investigator. Participants were asked to fill in the consent form and replied through e-mail before conducting the interview. The interviews took place through online meetings, using ZOOM. Participants were guided to answer the questions which are planned, follow up questions were asked by the researcher to address the research questions. All participants followed the same question sequence. The two most common supplementary questions: "Which sport would you like to perform", "How COVID-19 has affected you to do exercise?" were also answered by all participants. Interview duration ranged between 30-40 minutes. All interviews were audio-taped with the permission of the participants and transcribed verbatim. The audiotapes were first gone through intelligent verbatim transcriptions using the online charging platform 'Subanana'. This platform was developed by Hong Kong IT practitioners, they were dedicated to applying Cantonese voice recognition technology, provide artificial intelligent subtitle tools and services. Data cleaning has been done manually to correct mis-written characters. The researcher then did an edited transcription following the audio tape.

## Participants

As stated in the department website, the establishment of the Department of Health and Physical Education to is response to the challenge of health problems faced and to contribute to the physical education curriculum in Hong Kong. Staff in HPE department are assumed to have working for the mission of the department and to engage in physical activities for health. In October 2021, the VRC has been organized by the Sports Council from HPE department, to promote healthy lifestyle in EdUHK under COVID-19, all staff and students were invited to join the campaign. The HPE administrative staff were assumed to have the closest connections to the

sports event organized by Sports Council and well knowing the existence of the VRC. However, it is reported that none of the administrative staff from the HPE department has joined the VRC. In this study, with the purposive sampling, all administrative staff from the Health and Physical Education Department has been invited through e-mail, to have an in-depth look on what are the barriers and facilitators in participating sports event organized by the department.

The invitation e-mail provided information about the research and interview procedures. Participants who are interested in the research study had contacted the researcher by replying to the e-mail. With responding to the participants, an online interview timeslot was offered and all participants were asked to fill up the consent form to reassure the participation in the interview. All participants were joined voluntarily. All participants filled up the consent form were included in the study, no further exclusion has been done.

Eight out of twelve administrative staff had participated voluntarily in this research. With the response rate of 66.6%, comprising 5 females and 3 males. With the COVID-19 pandemic affecting Hong Kong since February 2020, the organization of sports event from Sports Council of HPE has suspended and thereafter, virtual mode of competitions was organized. Within 2 years' time, all participants were reported never joining virtual competitions organized by Sports Council. And only 2 participants were reported to have joined the authentic sports event organized by Sports Council before the pandemic. See TABLE 1 for the demographic details of the 8 participants.

TABLE 1. Demographic Details of the Participants

Name	Sex	Age Range	Time working in department
Interviewee A	F	30-39	0.5 year
Interviewee B	M	30-39	2 years
Interviewee C	F	40-49	>5 years
Interviewee D	F	30-39	2.5 years
Interviewee E	F	40-49	>5 years
Interviewee F	F	20-29	5 years
Interviewee G	M	30-39	1 year
Interviewee H	M	30-39	2.5 years

## Instruments

At the beginning of the interview, participants were asked to fill in the background information regarding gender, age range and year of incumbency in HPE department. Then under the direct interview by the researcher, participants were asked to fill in the Chinese version of the International Physical Activity Questionnaire - Short Form (IPAQ-S). Items in IPAQ-S were used to measure all aspects on leisure-time, working, travelling and

even doing household tasks within the last 7 days. The Chinese version of IPAQ-S has reported to have high reliability and reasonably valid (Macfarlane & Lee, 2004). Definitions for the exercise intensity levels were described in the questionnaire and verbally explained to the participants. Every individual was required to answer all 7 questions from the IPAQ-S for the structured part. Separate scores on walking, moderate-intensity and vigorous-intensity activity were calculated by the frequency and duration of participants performing corresponding activities, to determine participants' physical activity level. Number of hours subjects spend on sitting per day were also recorded, however, it is not used for the scoring of the physical activity level. METs is the metabolic equivalent, METs of the activity is the multiples of resting energy expenditure. Using the compendium (Ainsworth et al., 2000), each type of activity is derived an average MET score. In IPAQ-S, the score for walking is 3.3 METs, score for moderate intensity exercise is 4.0 METs and score for vigorous intensity exercise is 8.0 METs. The MET scores are used to multiply minutes spending on corresponding exercise per week for the data analysis. METs-minutes/week is the continuous score used to categorize participants in three level of physical activity in form of the categorical score: low, moderate and high level of activity. According to the scoring protocol (The IPAQ Group, 2005), the scoring criteria for each category are as follows:

- Low: Individuals not meeting criteria of “moderate” or “high” category physical activity level
- Moderate: Meeting any one of the three criteria: (a)  $\geq 3$  days of vigorous-intensity activity with  $>20$  minutes per day (b)  $\geq 5$  days of moderate-intensity activity / walking  $>30$  minutes per day (C)  $\geq 5$  days of any activity with total of  $\geq 600$  MET-minutes/week
- High: Meeting any one of the two criteria: (a)  $\geq 3$  days of vigorous-intensity activity and with total of  $\geq 1500$  MET-minutes/week (b)  $\geq 7$  days of any combination of physical activity with total of  $\geq 3000$  MET-minutes/week

For the second part of the interview, open-ended questions were developed based on findings from the literature surrounding the framework of SDT. Spaces were provided for interviewees to begin speaking from their experiences (Galletta & Cross, 2013). Questions such as: (1) What does ‘Exercise’ mean to you? (2) Do you think exercise regularly is important to you? Why? (3) Do you have any experience in using digital device to approach exercising? (4) What type of exercise do you participate in these days? (5) Have COVID-19 caused any impact to your exercise habit or intensity? (6) Do you think working in HPE have impact on your exercise habit? (7) What facilitates / hinder you to carry out exercise regularly? (8) What is your point of view towards

the use of digital device in running? (9) What are the facilitators and barriers to joining the VRC competition in 2021?

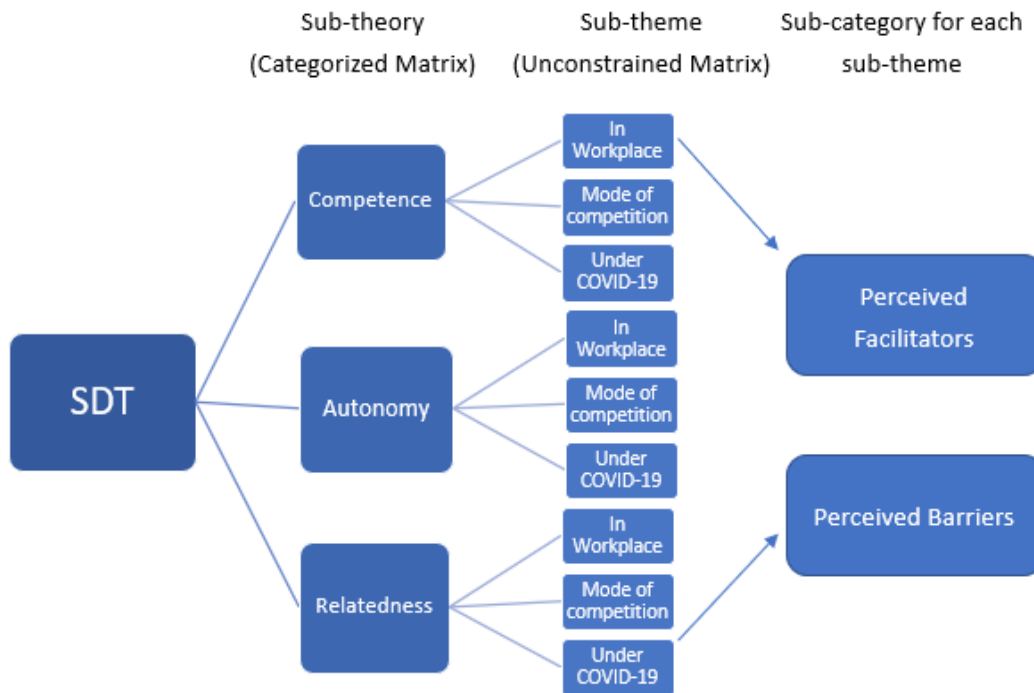
## Data Analysis

The analysis involved two parts, for the first part: analyzing the IPAQ-S data. The data collected from the IPAQ-S could be used to determine the categorical and continuous indicators of physical activity. As for the continuous measure, the volume of activity is computed by multiplying minutes spending on walking, moderate intensity and vigorous intensity activity separately with the number of days per week corresponding to the exercise.

A deductive content analysis is used when the data analysis is on the basics on earlier developed theory (Elo & Kyngäs, 2008). In this study, a deductive content analysis process from the themes developed under sub-theory of SDT-Basic Psychological Needs Theory (BNPT), this theory has 3 main theme: (1)autonomy, (2)competence and (3)relatedness (Ryan and Deci, 2002). Autonomy meaning the choice and volition for the individual to control their own behavior. Competence meaning the sense of accomplishment or the feeling of self-efficacy within the environment. Relatedness meaning the individual's connection and feeling belongingness within the environment or others. The 3 main theme in BNPT are used to be the themes in the categorization matrix in the deductive content analysis (Elo & Kyngäs, 2008). After the categorization matrix has been constructed, the sub-theme (unconstrained matrix) has been derived from participants dialogue, following the inductive content analysis process (Elo & Kyngäs, 2008). Continued by Elo and Kyngäs (2008), inductive content analysis involve the process: open coding, category creation, assembling data with similar meanings into one category. Also, with referencing to the research approach done by Goldfarb, Golan, & Gal (2021), this research would have the similar approach: (a)reading of the first transcript; (b) assigning code for descriptive comments related to the research question; (c) transforming relevant description categories in categorization matrix. By repeating step (a)-(c) with all the transcripts, data are organized and clustered into a list of main and sub-themes. The coded data were categorized into the three sub-themes to see whether participants have faced facilitators or barriers in the three main themes (autonomy, competence, relatedness): (1) in workplace; (2) in mode of competition; (3) under COVID-19. See Figure 1 for the analyzing framework.



Figure 1. Qualitative Data Analyzing Framework



To increase the validity of this research, the following measures has been done:

The audio tape recorded were transcribed verbatim using online charging artificial intelligent transcription services. The transcription is then turned into an edited transcription by the researcher with the ideas presented in a formal and comprehensive way. The respondent validation involved edited transcriptions were then sent to the subjects, checking for the accuracy on the interpretive claims (Bloor, 1978; Lincoln & Guba, 1985). All Chinese transcripts have been verified by the subjects. Google Translate showed high correlation with both human English translation and original Chinese wordings (Li et al., 2014). Coding has been then translated into English by Google Translate with the more accurate interpretation of the wordings delivered by the participants.

## Result

### IPAQ Result

The first section of the interview is the IPAQ-S which is used to determine the physical activity level of the subjects. With the subjects' self-response, data have been undergone analysis by following the guideline (IPAQ Group, 2005). TABLE 2 showed the reported physical activity per week of each participant. The continuous score has been calculated, ranging from 396 to 5318 MET-minutes per week in total. 4 participants are categorized to be highly active, 3 participants to be categorized as minimally active and with 1 participant in categorized as inactive.

TABLE 2. Reported Physical Activity per week

Interviewee	Sex	Days/	Minutes/	Days/	Minutes/	Days/	Minutes/	MET-	MET-	MET-	MET-	PAL
		week	week	week	week	week	week	min/week	min/week	min/week	min/week	
		VPA	VPA	MPA	MPA	walking	walking	VPA	MPA	walking	total	
Interviewee A	F	5	300	0	0	7	420	2400	0	1386	3786	HIGH
Interviewee B	M	1	60	3	135	6	180	480	540	594	1614	MODERATE
Interviewee C	F	6	240	4	120	3	120	1920	480	396	2796	HIGH
Interviewee D	F	2	60	3	180	6	180	480	720	594	1794	MODERATE
Interviewee E	F	1	40	7	210	7	1260	320	840	4158	5318	HIGH
Interviewee F	F	0	0	0	0	4	120	0	0	396	396	LOW
Interviewee G	M	3	180	0	0	4	40	1440	0	132	1572	HIGH
Interviewee H	M	0	0	0	0	7	420	0	0	1386	1386	MODERATE

NOTE: VPA= Vigorous Physical Activity  
 MPA= Moderate Physical Activity  
 PAL= Physical Activity Level

## Open-ended Question Result

From the response of the participants, the three sub-theme (1) in workplace (2) mode of competition (3) under-COVID 19 have been derived. These sub-themes are the three situation that closely affecting participants' willingness to participate in the VRC. Different participants faced various facilitators and barriers in the three situations in terms of autonomy, competence and relatedness.

### Sub-theme 1: In Workplace

Participants faced autonomy and relatedness barriers in workplace, no facilitators have been stated. And no competence support nor hindrance have been mentioned.

#### A. Autonomy support in workplace

For autonomy, a few participants mentioned that promotion about VRC in workplace is not enough causing misunderstanding and even not knowing the competition existed:

“I didn't pay much attention to the promotion e-mail and no one in office pushes admin staff to join, I thought only academic staff are needed to participate and I thought the competition could only be done indoor” (Interviewee F).

Autonomy meaning to have a choice between join or not to join the competition. However, in this case, the workplace environment had not provided sufficient promotion to let all staff know about the competition,

resulting in misconception about the competition. Autonomy support from the HPE department is not enough for staff to participate in department events.

For other staff who knew the competition mentioned that working pressure hindered their autonomy in participating:

“Busy at daily working, feeling tired after work and I would want to take a rest hinder me to do exercise” (Interviewee G).

With almost all the staff have mentioned time spending on working has hindered them to carry out regular exercise. Feeling exhausted after work backing their choice to do exercise which also hold up the interest in joining the VRC.

## **B. Relatedness support in workplace**

As for the relatedness support from the workplace, the active exercise atmosphere in department is not strong enough, some staff have the concern of being the odd one out if participating in the VRC:

“Because there is no special mention between colleagues. I think that this competition emphasizes the community, but if I am the only one in the department participating in it, I will feel uninvolved and no fun” (Interviewee G).

Some staff value on the bonding between colleagues, however, when the workplace does not have the active exercise atmosphere, the individual would also give up on the chance to participate workplace events preventing to be different from others.

## **Sub-theme 2: Mode of competition**

This study is based on the competition design held by Sport Council from HPE department in October, 2021. Competition aiming to help promote active lifestyles, allowing students and staff to participate individually or in a group of 6 forming the public group. Within two weeks' time, participants can run anytime, anywhere and upload their data to the STRAVA community. Top three participants with the most accumulated mileage within the competition group were offered a trophy. Mileage awards were also offered for participants with accumulated mileage over 5km, 10km, 15km, 21km and 42km, the more they run, the more they get. The background information was elaborated to the subjects in this study.

### **A. Autonomy with the mode of competition**

Participants faced facilitator about the flexible mode of competition in autonomy:

“The virtual run does not have too many restrictions, it is more flexible, the time and place can be determined by yourself” (Interviewee F).

With the flexibility of the competition mode, people were not restricted to participate in the specific date and time, this provided autonomy support for participants to choose to do exercise following their own schedule. However, in contrast, some participants faced barriers on autonomy with this mode of competition. While they are having own personal exercise habit, competition would not bring much effect on them, so they decided not to participate in VRC:

“People with running habit will keep running, people with no running habit will still not participate in running competition, two weeks competition is hard to help sustain exercise habit” (Interviewee A).

When participants having the concept of exercising regularly has been internalized with intrinsic motivation for them to do exercise in daily life. Outer autonomy support may not be the incentive for them to participate in the VRC. In the same case, people with low motivation from doing regular exercise would have a hard time to start and build up a habit. Although the VRC has offered autonomy support to participants, needs for the new runners not participating in has not been catered.

## **B. Competence with the mode of competition**

With the mode of competition, participants faced various advantage on fulfilling their competence and no barriers in feeling the sense of competence. Most participants believed the mode of competition is the facilitator for them to challenge themselves:

“Joining the competition offer challenges to myself, seeing the ranking, trying to improve, and see what can achieve at last” (Interviewee F).

Other participants believed that the mileage awards setting achievable goals which helped them to gain the sense of competence:

“The mileage award is a good arrangement, because it is very far away for me to strive for the top three. Mileage award set goals for me, as a milestone for achievement” (Interviewee D).

The setting of mileage awards let participants having a chance to win, catering the needs other than elite athletes.

## **C. Relatedness with the mode of competition**

With the relatedness, some participants see VRC as a good media to have virtual connections:

“I am interested in joining the group competition, because of participating with friends, the goal can be achieved...Although we cannot see each other, I can still receive back-up from teammates, encouraging everyone to run with texts” (Interviewee F).

Although participants in the VRC were not necessarily to see each other, VRC provided platform for participants to communicate and work on the same goal. With the interviewee description, the VRC is a good instrument connecting people.

On the contrary, the competition atmosphere is the very most concern among the participants in this study. Authentic competition offers participants face-to-face communications while participants can only communicate through text, photos online in VRC. Which may not be the mode of competition participants in this research wanted, the two most representation quotes are as follows:

“When I decided to join running competition, I would want to enjoy the competition atmosphere with large group of people at the same time, virtual competition couldn't offer me this” (Interviewee B).

And

“I am used to authentic competition, like a fun day, real support with colleagues to students and schools, having more competitive atmosphere...No drive for me to run. Self-discipline for me to start the app and finish the exercise just doesn't give me much motivation” (Interviewee D).

Participants in this research are more likely to have authentic connections with other participants in competition. Real-time socializing is important to feel being involved in the competition. Authentic competition provides a chance for participants to provide social support to others, while participants think that VRC hinder this type of connections, facing the barrier in relatedness in this mode of competition.

### **Sub-theme 3: Under the COVID-19 Pandemic**

The COVID-19 pandemic has brought great obstacles for the functioning of the society. Reported by the participants, COVID-19 has interrupted their exercising habit. They faced barriers in exercising autonomy and in social relatedness in the pandemic situation.

#### **A. Autonomy under the COVID-19 Pandemic**

Facing the restrictions on social distancing, closing of sports facilities, participants reported that COVID-19 had highly interrupted their autonomy when doing exercise which forced them to give up on their exercise routine:

“I used to go outdoor running, but COVID-19 is not safe to do outdoor running, this hindered me to run and is boring to run on a treadmill, I'd rather use the time to do other exercise” (Interviewee C).

Autonomy has been frustrated by the COVID-19, making people have concern in participating VRC as it encouraged people to have outdoor running. Participants faced barriers on the choice of exercise type, most of them had shifted from team sports or ball games requiring two or more people to individual sports such as: running or home exercising. Choice of exercising type had been significantly decreased. For the participants who chose running to be their major sports had to adjust their routine to avoid crowds and decrease the chance of infection.

## **B. Relatedness under the COVID-19 Pandemic**

Social distancing measures has been introduced to prevent virus spreading. The measures have demolished the sense of relatedness between participants and friends:

“I like to exercise with others, but I can only exercise by myself during the pandemic, which reduces my social interaction with friends” (Interviewee D).

Social connections have been destroyed, all authentic competition have been cancelled, participants communicating with teammates have been prohibited because of the social distancing measure. Loosing close connections with friends or colleagues may also hindered them to join in the VRC.

Participants faced various facilitators and barriers on autonomy, relatedness and competence under the three conditions

## **Discussion**

This recent research has provided the first look into the basic psychological needs of workplace employee to participate in VRC. Mixed-method with the quantitative data analysis of IPAQ-S and deductive qualitative data analysis of the open-ended questions based on the SDT concepts had been used to address the research questions. The result in IPAQ-S highlight 50% of the participants are in high physical activity level, 37.5% of participants are in moderate physical activity level and only 12.5% of participants are in low physical activity level. The result from the qualitative analysis highlights the frustration participants faced in autonomy and relatedness mainly from the workplace and under COVID-19 pandemic leading them not to join the VRC. On the other hand, participants expressed the satisfaction in competence by the competition mode of VRC, with no barriers in other two situations.

In the following paragraphs, the association between satisfying basic psychological needs of the participants and current literature, highlighting similarities to the SDT literature with sports competition and workplace environment will be presented. Furthermore, the practical implications of the study's results will be suggested.

### **Psychological needs of employees in workplace for VRC**

Current studies mostly focus on the effectiveness of the VRC, using VRC to be the intervention promoting healthy lifestyle. Study in the psychological needs of the non-participants have not been investigated. With the results in this study, participants faced barriers in autonomy and relatedness which hinders their participation in VRC. Participants reported to be having not enough time to do exercise after work, which implies the restriction of autonomy of working time in workplace. With the research done by the International Labour Organization

(ILO) (2018), the positive effects of flexible working time are not only on work-life balance but also on employees' health and well-being.

Moreover, participants faced barriers in social relatedness with colleagues which hindered the participation of VRC. From the research done by McDonough and Crocker (2006), they suggested that social relationships hold an important role for the adults to be motivated in the dragon boating event. In this study, results showed the similarity to the literature. Most participants had given suggestions to improve the VRC by adding more connections between participants. However, the exercise atmosphere of the workplace in this study was not strong enough to bond employees participate in the sports events organized for the staff. More relatedness support from the competition has to be done to boost the bonding between colleagues.

Sense of competence has been satisfied with the mode of competition. Most participants see the competition to be offering optimal challenges for them to achieve, motivating them to participate in the competition. Although the competence had been satisfied, subjects still chose not to join the competition may verify the statement made by deCharme (1968) only feeling of competence would not foster intrinsic motivation otherwise accompanied by the sense of autonomy (as cited in Ryan & Deci, 2000).

### **Practical Implications**

Several practical implications for promoting VRC to adults in workplace have been suggested from the study's result. To address the barriers in autonomy and relatedness in workplace, organizers of the VRC can focus on the promotion activities to be specialized to office staff, providing more opportunities for staff to get to know the competition and taking the first step to choose joining or not joining, then organizers can design different competition group to let participants choose which level they are in, such as leisure run, intermediate level or competition level also with the set up of group competition. Group competition emphasizing the representation of working team or the "department" (in this study), could help to build the sense of belongings to the workplace. Receiving support from colleagues and feelings of being in the part of the group would boost the relatedness of the individual to the working environment (Furrer & Skinner, 2003).

As for the mode of the competition, flexibility on time and venue for this competition would have been one of the rationales to attract participants (Wattanapisit et al., 2020). In order to further provide autonomy for participants, organizers could offer different goal-based competition for participants to path their way to achieve the goal. Such as time-based goal, record the time for the same distance and compete with others or with the distance-based goal, running as far as they can, to enhance autonomy support to participants. For the relatedness support from the mode of competition, organizer can emphasize on group task, setting goals for the group to achieve. "Task cohesion" meaning the feeling of the team member on the harmony of teamwork within the

group which also reflects the cooperation quality among the team (Auzoult, 2013). With reference to Lavigne, Vallerand and Crevie-Braud (2011), cooperation quality can be used to explain the sense of relatedness by the sense of acceptance and sense of intimacy (as cited in Auzoult, 2013). It is assumed that the more the running of teamworking, the stronger the sense of relatedness among the team. When more group tasks from the VRC are offered, interactions between members while striving for the task may be increased. With rising sense of relatedness, individuals are more likely to continuous on the activity (Ryan & Deci, 2000). Other than group tasks, results also suggested doing exercise with peers provides much drive for some participants. Therefore, offering group training sessions may further emphasize the sense of community by inviting some experienced runners to guide new runners into running.

### **Limitation**

This research aims to achieve the detailed understanding of the participants' perceived barriers and facilitators to join or not join the VRC through the lens of SDT and to suggest ways for VRC to cater basic psychological needs of the adults. The results were assumed to applicable to the general office staff population. Sample in this study focused in one department staff and 87.5% of the participants are having regular physical activity with moderate or higher levels of physical activity level, the basic psychological needs for the inactive population to join the VRC is not addressed in this study.

This research is done by one author, validity has been strengthened with respondents' validation on the edited transcription. In the process of coding the transcripts, only one author is involved, intercoder reliability has not been verified. Intra-coder reliability has been tested with comparing the author first coding and second coding.

### **Further Research Direction**

Expending research to the wider staff community or other workplace, such as other department in EdUHK. This would provide a broader perspective on the basic psychological needs of adults to participate in VRC. In addition, conducting similar research to adults who does not have regular exercise activity or is physically inactive would help to further identify the needs of this population, which could further promote VRC to a wider range of participants as well as promoting the active lifestyle for the Hong Kong populations. Moreover, further research on the practical implications suggested from this study can be done to investigate the effectiveness for the populations to establish exercising habit with the modified VRC versus non-modified VRC based on SDT components.



## Conclusion

The current research offers a preliminary examination of perceived facilitators and barriers faced by HPE staff from EdUHK based on the SDT framework, leading to practical implications on the mode of competition and what to do on promoting virtual competition events in workplace. Results suggested more relatedness and autonomy support from the workplace environment and the competition mode of the VRC could be provided to cater adults' psychological needs in exercising. Fulfilling the basic psychological needs of participants would help to internalize the motivation of doing exercise, participants carrying regular physical activity by themselves would be the ultimate goal for the VRC.



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# Appendix I

## Interview Protocol

### INTERNATIONAL PHYSICAL ACTIVITY QUESTIONNAIRE

國際身體活動問卷

#### Personal information 個人資料

Name of participant 受訪者姓名：\_\_\_\_\_

Age 年齡：\_\_\_\_\_

Sex 性別：\_\_\_\_\_

We are interested in finding out about the kinds of physical activities that people do as part of their everyday lives. The questions will ask you about the time you spent being physically active in the **last 7 days**. Please answer each question even if you do not consider yourself to be an active person. Please think about the activities you do at work, as part of your house and yard work, to get from place to place, and in your spare time for recreation, exercise or sport.

我們對找尋人們在他們日常生活中多種的身體活動有興趣，這個問卷會問你在最近 7 天花在身體活動的時間，請回答每一個問題，甚至如果你想自己是一個沒有活動的人，請想一想你在工作時的活動、像是你在家裡或園藝的部份、從一個地方到一個地方及在你空閒的時間運動或娛樂。

Think about all the **vigorous** activities that you did in the last 7 days. **Vigorous** physical activities refer to activities that take hard physical effort and make you breathe much harder than normal. Think *only* about those physical activities that you did for at least 10 minutes at a time.

想一想在最近 7 天裡你做過所有強而有力的活動，強而有力的身體活動是指以費力的身體負荷且讓你呼吸較正常更為急促的活動，僅回想你所做過每次至少 10 分鐘的那些身體活動。

The content collect in this questionnaire will keep confidential and data will only be used on the study.

本問卷的內容將會被保密，所收集的資料僅會用於此研究上，不會提供給其他單位。

1. During the last 7 days, on how many days did you do vigorous physical activities like heavy lifting, digging, aerobics, or fast bicycling?

最近 7 天裡，你花多少天做強而有力的身體活動，像是提重物、苦力、有氧運動或快騎腳踏車？

\_\_\_\_\_ days per week 每週幾天

No vigorous physical activities → Skip to question 3





沒有強而有力的身體活動 → 跳到問題 3

2. How much time did you usually spend doing vigorous physical activities on one of those days?

在參與強有力身體活動的那些天，你通常花多少時間做強而有力的身體活動？

\_\_\_\_\_ hours per day 每天幾個小時

\_\_\_\_\_ minutes per day 每天幾分鐘

Don't know/Not sure 不知道/不確定

Think about all the moderate activities that you did in the last 7 days. Moderate activities refer to activities that take moderate physical effort and make you breathe somewhat harder than normal. Think only about those physical activities that you did for at least 10 minutes at a time.

想一想最近 7 天你做過所有適度的活動，適度的活動是指以適度的身體負荷並且讓你呼吸比正常費力一些的活動。

3. During the last 7 days, on how many days did you do moderate physical activities like carrying light loads, bicycling at a regular pace, or doubles tennis? Do not include walking.

最近 7 天裡，你花多少時間做適度的身體活動，像是提輕的物品、正常的速度騎腳踏車或網球雙打？不包含走路。

\_\_\_\_\_ days per week 每週幾天

No moderate physical activities → Skip to question 5

沒有適度的身體活動 → 跳到問題 5

4. How much time did you usually spend doing moderate physical activities on one of those days?

在參與適度身體活動的那些天，通常你花多少時間做適度的身體活動？

\_\_\_\_\_ hours per day 每天幾小時

\_\_\_\_\_ minutes per day 每天幾分鐘

Don't know/Not sure 不知道/不確定

Think about the time you spent walking in the last 7 days. This includes at work and at home, walking to travel from place to place, and any other walking that you might do solely for recreation, sport, exercise, or leisure.

想一想最近 7 天你花多少時間在走路，包含工作、在家、從某地到某地、娛樂、遊戲或休閒時的走路。



5. During the last 7 days, on how many days did you walk for at least 10 minutes at a time?

最近 7 天裡，你花多少天走每次至少 10 分鐘的路？

\_\_\_\_\_ days per week 每週幾天

No walking → Skip to question 7

沒有走路 → 跳到問題 7

6. How much time did you usually spend walking on one of those days?

在走路的那些天，你通常花多少時間在走路？

\_\_\_\_\_ hours per day 每天幾小時

\_\_\_\_\_ minutes per day 每天幾分鐘

Don't know/Not sure 不知道/不確定

The last question is about the time you spent sitting on weekdays during the last 7 days. Include time spent at work, at home, while doing course work and during leisure time. This may include time spent sitting at a desk, visiting friends, reading, or sitting or lying down to watch television.

最後的問題是在最近連續 7 個非假日時間（扣除週六與週日）你花多少時間在坐著，包含花在工作、家裡、做作業及休閒時的坐著，這或許可以包含花在書桌、拜訪朋友、讀書或看電視的躺著或坐著。

7. During the last 7 days, how much time did you spend sitting on a week day?

\_\_\_\_\_ hours per day 每天幾小時

\_\_\_\_\_ minutes per day 每天幾分鐘

Don't know/Not sure 不知道/不確定

**This is the end of the questionnaire, thank you for participating.**

問卷最後感謝你的參與。



## Questions for interview

### 訪問問題

- 1. What does 'Exercise' mean to you?**  
“運動”對您意味著什麼？
  
- 2. Do you have any experience in using digital device to approach exercising?**  
您有使用數碼設備進行運動的經驗嗎？
  
- 3. Do you think exercise regularly is important to you? Why?**  
您認為經常運動對您來說重要嗎？為什麼？



**4. What facilitates / hinder you to carry out exercise regularly?**  
什麼促進/阻礙您定期進行運動？

**5. What are the facilitators and barriers to joining the VRC competition in 2021?**  
2021 年參加 VRC 比賽有哪些促進因素和障礙？

**6. Could you share the experience of your participations in VRC hosted in 2021 as well as 2020?**  
您能否分享一下您參加 2021 年和 2020 年舉辦的 VRC 的經驗？



**7. What is your point of view towards the use of digital device in running?**

您對跑步中使用數碼設備有何看法？

**8. Have you ever joined the sports events organized by the department?**

您有否參與過部門活動？



## Appendix II

Edited Transcripts (verified by interviewee)

Subject	Document Link
Interviewee A	<a href="https://docs.google.com/document/d/1qqWN8uLuSKvYwZ8kQREDBbqtF7rsvfULRwXn8GFphy4/edit?usp=sharing">https://docs.google.com/document/d/1qqWN8uLuSKvYwZ8kQREDBbqtF7rsvfULRwXn8GFphy4/edit?usp=sharing</a>
Interviewee B	<a href="https://docs.google.com/document/d/1mW5vwZiFyKIofk9tWGBCKyqnwXKQqJmHRv-vDLPWX6Q/edit?usp=sharing">https://docs.google.com/document/d/1mW5vwZiFyKIofk9tWGBCKyqnwXKQqJmHRv-vDLPWX6Q/edit?usp=sharing</a>
Interviewee C	<a href="https://docs.google.com/document/d/1lIRp-PFj2kTM4grB37FmS1Kml2HTbKMo4zy7YpoLh0/edit?usp=sharing">https://docs.google.com/document/d/1lIRp-PFj2kTM4grB37FmS1Kml2HTbKMo4zy7YpoLh0/edit?usp=sharing</a>
Interviewee D	<a href="https://docs.google.com/document/d/1E_hF3AiVntfgpPdsayeMyfNejU3McLy0vIbNIh2jnpY/edit?usp=sharing">https://docs.google.com/document/d/1E_hF3AiVntfgpPdsayeMyfNejU3McLy0vIbNIh2jnpY/edit?usp=sharing</a>
Interviewee E	<a href="https://docs.google.com/document/d/1bxLmHO4k3Zbe9JtXrZNSMn5hR3E4Kja3F_1hhunOCgc/edit?usp=sharing">https://docs.google.com/document/d/1bxLmHO4k3Zbe9JtXrZNSMn5hR3E4Kja3F_1hhunOCgc/edit?usp=sharing</a>
Interviewee F	<a href="https://docs.google.com/document/d/1Js2o7xZfZ48908ke9PBGvzAJWUjuLjUNBzJWEJkWozM/edit?usp=sharing">https://docs.google.com/document/d/1Js2o7xZfZ48908ke9PBGvzAJWUjuLjUNBzJWEJkWozM/edit?usp=sharing</a>
Interviewee G	<a href="https://docs.google.com/document/d/1BuGCy3vUk0joeZ0s8Tij_tilkG0GLoPBc8g-Rs4Gbuk/edit?usp=sharing">https://docs.google.com/document/d/1BuGCy3vUk0joeZ0s8Tij_tilkG0GLoPBc8g-Rs4Gbuk/edit?usp=sharing</a>
Interviewee H	<a href="https://docs.google.com/document/d/15KlyNTfIVkwbpbcvr3lKvzqlPLGQ9Odzq5c8kCDYxwo/edit?usp=sharing">https://docs.google.com/document/d/15KlyNTfIVkwbpbcvr3lKvzqlPLGQ9Odzq5c8kCDYxwo/edit?usp=sharing</a>