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The Association of Virtual Exercise Classes and Well-Being During COVID-19 Among University Employees

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Abstract

This cross-sectional study sought to examine the association of virtual exercise with physical activity (PA), general, and mental health during COVID-19 among university employees. Individuals completed an online survey with questions about demographic, sleep, substance use, and virtual exercise participation. The International Physical Activity Questionnaire and 36-Item Short Form Health Survey assessed PA, general, and mental health. Data were analyzed for descriptive, correlation, and multiple regression models. Complete data were collected from 122 participants with a mean age of 45.6 ± 13.1 years. Participation in virtual exercise were highest for twice a week (24.6%) followed by once a month (17.2%) and never (17.2%). Over a quarter of participants reported an increase (29.1%) in alcohol use. No significant differences were found in total MET-min between before (1952 ± 1373) and during-COVID (1973 ± 1692) ($p > .05$); however, virtual exercise participation significantly associated with an increase in PA ($\beta = 609.08, p = .01$). Statistically significant positive relationships were also found between higher PA and better general health ($\beta = .005, p < 0.01$), and emotional well-being ($\beta = .004, p < .05$). Self-reported COVID disruptiveness was negatively associated with emotional well-being ($\beta = -3.28, p < 0.001$). This data suggested that virtual exercise courses were associated with maintaining PA which may indirectly regulate general and mental well-being during the pandemic for university employees.

Authors

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Introduction

In 2020, the coronavirus pandemic (COVID-19) caused national “lockdowns” across the United States in which strict governmental restrictions were implemented to prevent exposure and spread of the virus. Guidelines included home confinement regulations, hygiene standards, and social distancing measures (Lau et al., 2020). A wide spectrum of containment actions were taken, including increased telecommuting efforts as well as limiting and/or temporarily closing businesses, schools, in-person doctor visits, public transportation and international airline travel (Dwyer et al., 2020).

In a recent study, individuals with higher levels of sedentary behavior were more likely to have increased anxiety and depressive symptoms during the pandemic closures. (Huckins et al., 2020). The European World Health Organization warns staying home for prolonged periods of time can lower daily physical activity (PA) (Organization). Also, the necessity to self-quarantine may cause additional stress and mental health problems (Constandt et al., 2020; Dwyer et al., 2020). Despite strict social distancing and quarantine policies, public health officials and organizations have recommended engaging in sufficient amounts of PA to prevent declines in mental and physical health during the pandemic (Constandt et al., 2020; Dwyer et al., 2020). Specifically, the American College of Sports Medicine (ACSM) and the World Health Organization (WHO) recommend that adults participate in 150 to 300 minutes of PA per week, including home-based exercise and innovative strategies to stay active during quarantine (Medicine, 2020).

With the closure of gyms and recreational facilities, ACSM and WHO guidelines recommending individuals to continue regular PA during the pandemic presents a challenge for individuals who previously participated in group fitness classes. A solution may be found in remote or virtual exercise classes which caters a similar social environment and structure. The effectiveness of remote exercise classes was examined in several intervention studies prior to the COVID-19 pandemic. A recent intervention implementing exercise program in older adults reported that remotely delivered Tai Chi program was more effective than home-based program

in terms of program compliance and fall prevention (Wu et al., 2010). The feasibility and affordability of online exercise is also noted in Vandelanotte's study on a web-based personal training intervention, in which PA levels increased over an 8-month period compared to baseline levels (Vandelanotte et al., 2018). In a randomized controlled trial, Alley's study showed previously inactive individuals increased to 150 minutes exercise per week over a 9-week period with a web-based intervention of combined online tailoring and video coaching (Alley et al., 2016). While these studies highlight the efficacy of virtual fitness in specific populations, they do not highlight the effect of virtual exercise classes during the pandemic, nor the effect on general physical health, emotional wellbeing, or sleep during the COVID-19 lockdown. The current cross-sectional study is unique in its attempt to analyze the relation of virtual group exercise classes and health outcomes during the COVID-19 pandemic.

Historically, PEAK Health and Fitness at the University of Utah offer a wide variety of classes including circuit training, core training, mat Pilates, stretch and strengthen, total body fitness, weight training, and yoga to all employees. These classes were in a group setting with an instructor to guide the group in a specific, structured exercise program. Due to the breakout of the COVID-19 in 2020, University of Utah closed in-person classes after spring break and transitioned to online formats. The university employee were also switched to working from home after spring break of 2020. The population of this study included a majority of University of Utah employees which, 85% moved to remote settings due to the shutdown of the university and the Salt Lake community. The primary purpose of this study was to evaluate the effectiveness of PEAK online PA classes to maintain and/or increase PA levels during the 2020 pandemic lockdown in Salt Lake City, Utah. A secondary purpose was to examine the virtual exercise classes as a way to maintain physical and emotional health during the pandemic.

Materials and Methods

Sample and Procedures: This study was designed as a cross-sectional study. Participants were a convenience sample of individuals currently or previously enrolled in University of Utah PEAK exercise classes. Study invitation emails were sent the final week of the classes in Summer 2020 and another reminder email was sent the following week in an attempt to collect data from PEAK participants who had not yet taken part in the questionnaire. A Redcap study survey link was included in the emails. Upon submission, the participant's email was entered in a

raffle for a chance to earn one of eight \$25 gift cards. Study inclusion criteria were 1) 18 years of age or older and 2) have participated in at least a single session of a PEAK class in the past. The protocol of this study was approved by the University IRB and all participants completed a written informed consent prior to participating in this study.

Assessment: Participants completed a self-report questionnaire through RedCap platform. Demographic questions included age, gender, race, ethnicity, marital status, number of children, income, education, affiliation, employment status, and work mode.

Questions were asked about the types and frequency of exercise class attendance in Summer 2020 (from May to July). Frequency options ranged from never, to: once a month, 2-3 times per month, once a week, two times per week, three times per week, four times per week, and five or more times per week. Types of classes included weight training, Pilates, circuit training, yoga, bootcamp, strength and strengthen, and Zumba. Participants were also asked their perception on how well PEAK helped them to maintain PA and stress management. These response options included strongly agree, somewhat agree, neutral, somewhat disagree, and strongly disagree.

International Physical Activity Questionnaire (IPAQ) short form was used to assess the PA levels before March (before COVID-19) and activity levels from May to July (during COVID-19). IPAQ was previously validated with validity ranges from .9 - .39 when compared to criterion measures for assessing PA (Lee et al., 2011).

Ten items from 36-Item Short Form Health Survey (SF-36) were incorporated to measure general health (5 items) and emotional wellbeing (5 items) during pandemic closures. SF-36 is a commonly used, well-validated, self-report measure of health. It comprises of 36 questions which cover eight domains of health such as limitations in physical activities because of health problems, bodily pain, vitality (energy and fatigue), general health perception, and others. The reliability of the SF-36 has been tested with Cronbach's Alpha reliability coefficient of .91 for mental health/ emotional wellbeing, and a coefficient of .90 regarding general health. The five questions regarding general health included "in general, would you say your health is:" and responses on a 5-point Likert scale from "excellent" to "poor", four other questions on the 5-point Likert scale of responses from "definitely true" to "definitely false" assessed general health including "I seem to get sick a little easier than other people", "I am as healthy as anybody I know", "I expect my health to get worse" and "my health is excellent". For emotional wellbeing,

five questions were also taken from the SF-36 with a 5-point Likert scale response from “all of the time” to “none of the time” asking participants about the past 4 weeks with questions including “have you: (1) been very nervous, (2) felt so down in the dumps that nothing could cheer you up, (3) felt calm and peaceful, (4) felt downhearted and depressed, (5) been a happy person [11].

Sleep variables of duration and change of sleep duration were included. The level of disruption the pandemic had on their daily lives (Likert scale from 1 to 10), the change of alcohol, cigarette use, and vaping (not used, decreased, no change, and increased) were also self-reported in the study survey.

Statistical Analyses: Descriptive statistics were computed for participants’ demographic information, PA levels, sleep characteristics, general health, emotional wellbeing, PEAK participation, COVID-19 disruption, alcohol, cigarette, and vaping use. A chi-square test was conducted to examine any distribution differences in these categorical variables. The guidelines for processing IPAQ data were followed. Specifically, walking was considered equivalent to 3.3 METs, moderate PA 4.0 METs and vigorous PA equal to and above 8.0 METs. Total PA MET-minutes/week was calculated by summing walking, moderate, and vigorous MET-minutes per week. A dependent t-test was conducted to examine the pre- and during-COVID-19 PA levels. Change in PA was computed by the subtraction of before- from during- COVID-19 total MET-minute values. Pearson Product-moment correlation coefficient matrix was computed among all the key variables. The cut-off points of weak, moderate, strong correlation are .4 and .7 (Mukaka, 2012). Participation in PEAK was recoded to “yes” for these options ranging from “once a week” to “five or more times per week” and “no” for these options ranging from “once a month” to “never”. PEAK class participation (Yes vs no) was tested as a predictor to assess the association of PEAK class participation on maintaining PA during COVID-19. To assess the impact of change in PA levels on physical and mental health, two sets of multiple regression models were performed. The first (model 1) is tested without change in PA levels and the second (model 2) is tested with change in PA levels. PEAK class participation, perceived pandemic interruption, gender, and having kids live with were entered as predictors and the past month’s physical or mental health was the primary outcome variable. Various demographic variables were controlled in the multiple regression analysis. All independent variables are entered into the equation in one step. Reporting of the results included the β coefficient with corresponding 95%

Confidence Intervals. All analyses were conducted with SAS 9.4 (Cary, NC) software. The alpha value for significance testing was set at .05 for hypothesis testing.

Results

Of the 122 participants, the sample demographics were refined to a majority female (86.2%), mean age of 45.6 years, Caucasian (85.8%), married (65.8%), with at least a four-year college degree (91.6%), of upper middle class socioeconomic status (63.6%), affiliated with the University of Utah (95.1%), full time employment status (85.3%) and working remotely (85.5%) at the time of this study. Chi-square test regarding the above variables were all significant ($p < .01$), indicating the distributions of the responses differ from each another for all the demographic characteristics. (Table 1).

Table 1 Sample demographic characteristics

		Frequency	Percent (%)	<i>p</i>
Gender	Male	20	16.8%	<.0001
	Female	99	83.2%	
Race	White	103	85.8%	<.0001
	Asian	9	7.5%	
	Native American	1	0.8%	
	Two or more races	4	3.3%	
	Other	3	2.5%	
Ethnicity	Hispanic	5	4.2%	<.0001
	Not-Hispanic	114	95.8%	
Marital Status	Married	79	65.8%	<.0001
	Divorced	9	7.5%	
	Never Married	28	23.3%	
	Widowed	3	2.5%	
	Separated	1	0.8%	
Income Level	Less than \$25,000	2	1.7%	<.0001
	Less than \$50,000	15	11.9%	
	\$50,000 - \$74,999	27	22.9%	
	\$75,000 - \$99,999	16	13.6%	
	\$100,000 - \$149,999	35	29.7%	
	\$150,000 or more	24	20.3%	
Education Level	High school degree	4	3.4%	<.0001

	Associate's degree	6	5.0%	
	College degree	32	26.9%	
	Graduate degree	77	64.7%	
Affiliation (University of Utah)	Yes	116	95.1%	<.0001
	No	6	4.9%	
Employment Status	Full time	104	85.3%	<.0001
	Part time	6	4.9%	
	Furloughed	2	1.6%	
	Unemployed	2	1.6%	
	Retired	7	5.7%	
	Other	1	0.8%	
Work Location	Remotely	94	85.5%	<.0001
	On-site	10	9.1%	
	Other	6	5.5%	
Kid(s) in the Home	Yes	35	28.7%	<.0001
	No	87	71.3%	

In Table 2, PEAK class participation, muscular exercise, sleep, substance use, and COVID-19 disruption characteristics were summarized. Muscular activities, unsurprisingly, went down during the outbreak from 62.5% to 50.0%. Further on exercise, 73% of participants reported prior experience through PEAK. Close to a quarter (24.6%) of participants engaged in PEAK class twice a week, a following 17.2% participated once a month, and 9.8% enrolled once a week or 2-3 times a week, respectively. Slightly less than three quarters (i.e., 72%) of participants somewhat and strongly agreed that PEAK virtual exercise helped them to maintain PA levels during quarantine, and a similar 72% agreed that PEAK online exercise classes helped them to manage stress during the outbreak. The highest attendance fell in the classes of yoga (41%) and circuit training (32.8%). The lowest attendance fell into the classes of bootcamp (8.2%), Zumba (9.8%), and Pilates (8.2%). In the middle of these two categories of participation were strengthen and stretch (24.6%) and weight training (13.1%). Nearly half of Individuals reported that they slept about the same (49.2%). Interestingly, over a quarter reported sleeping 0.5 hours to 2 hours more (27.1%). Considering substance use, 36.4% of participants experienced no change in alcohol use, 27.3% didn't drink previously, 8.3% decreased, and 28.1% increased alcohol intake. Smoking and vaping remained the same and at a very low level

of 92.6% reported never having used tobacco products including cigarettes and vaping. The rest of 7.4% had no change in smoking or vaping behaviors (Table 2).

Table 2 Descriptive statistics of PEAK participation and health outcomes

Sleep Characteristics		Frequency	Percent (%)
Hours Of Sleep	6 hours or less a night	27	22.3%
	7-8 hours a night	85	70.3%
	9 hours or more a night	9	7.4%
Sleeping: More/Less	Slept > 2 hours less	5	4.1%
	Slept .5-2 hours less	23	18.9%
	About the same	60	49.2%
	Slept .5-2 hours more	33	27.1%
	Slept > 2 hours more	1	0.8%
PEAK Characteristics			
Previous PEAK Participation	Yes	89	73.0%
	No	33	27.1%
PEAK Class Frequency	Five or more times a week	7	5.7%
	Four times a week	10	8.2%
	Three times a week	9	7.4%
	Two times a week	30	24.6%
	Once a week	12	9.8%
	2-3 times a week	12	9.8%
	Once a month	21	17.2%
	Never	21	17.2%
PEAK help to maintain PA	Strongly agree	55	48.3%
	Somewhat agree	27	23.7%
	Neutral	20	17.5%
	Somewhat disagree	8	7.0%
PEAK help to deal with stress	Strongly disagree	4	3.5%
	Strongly agree	51	42.5%
	Somewhat agree	35	29.2%
	Neutral	27	22.5%
PEAK Class Specification	Somewhat disagree	4	3.3%
	Strongly disagree	3	2.5%
	Weight Training	16	13.1%
	Pilates Mat	10	8.2%
	Circuit Training	40	32.8%
	Yoga	50	41.0%

	Bootcamp	10	8.2%
	Stretch and Strengthen	30	24.6%
	Zumba	12	9.8%
Other Physical Activity Characteristics			
Pre Muscular Exercise Days	<2 days	45	37.5%
	>= 2 days	75	62.5%
During Muscular Exercise Days	<2 days	58	50.0%
	>= 2 days	58	50.0%
Substance Abuse			
Alcohol	Not used	33	27.3%
	Decreased	10	8.3%
	No change	44	36.4%
	Increased	34	28.1%
Cigarettes	Not used	113	92.6%
	No change	9	7.4%
Vaping	Not used	112	92.6%
	No change	9	7.4%

Abbreviations—PA: Physical Activity.

For continuous variables, pre-COVID-19 PA was recalled at a mean of 1951.5 MET-minutes per week, during-COVID-19 at 1973.0 MET-minutes per week, with change in PA found to be a mean of 16.5 MET-minutes per week. General health mean was 70.2 and emotional wellbeing 62.7 out of 100. The average COVID-19 disruption scale report was 6.8 with 10 at the most disruptive stage (Table 3).

Table 3. Descriptive statistics about sample characteristics

	N	Mean	SD
Age	119	45.6	13.1
Pre-Covid PA (MET-min)	122	1951.5	1373.0
Post-Covid PA (MET-min)	121	1973.0	1692.0
Change in PA (MET-min)	121	16.5	1315.0
General Health	121	70.2	18.1
Emotional Wellbeing	122	62.7	22.7
Covid Disruption Scale	122	6.8	2.3

Abbreviations—PA: Physical Activity; SD: Standard Deviation.

Pearson product-moment correlation was used to examine the interrelation among key variables (PA, PEAK class participation frequency, COVID-19 disruption, general and emotional health, alcohol, sleep, having kids or not) and the results were presented in Table 4. Small to moderate but significant correlations were found between PA and PEAK class participation frequency ($r= 0.29, p<0.01$). General health was positively associated with PA ($r=0.33, p<0.01$) and PEAK class participation frequency ($r= 0.22, p< 0.01$). Similar correlations were found between emotional wellbeing with PA ($r= 0.28, p< 0.01$) and PEAK class participation frequency ($r= 0.25, p<0.01$). In addition, stronger associations were found between general health and emotional wellbeing ($r= 0.43, p< 0.01$). Not surprisingly, emotional wellbeing was negatively associated with COVID-19 disruption ($r= -0.39, p< 0.01$).

Table 4: Pearson correlation coefficients

	PA	1	2	3	4	5	6	7	8
Class Frequency (1)	0.29**								
COVID Scale (2)	-0.16	-0.06							
General Health (3)	0.33**	0.22**	-0.16						
Emotional Wellbeing (4)	0.28**	0.25**	-0.39**	0.43**					
Alcohol Consumption (5)	-0.28	-0.13	0.10	-0.13	0.00				
Hours of Sleep (6)	0.10	-0.13	-0.01	0.15	0.14	0.14			
Sleep More/Less (7)	0.11	0.09	-0.07	0.02	0.13	0.10	0.28		
Kids in the Home (8)	0.06	-0.04	-0.08	0.16	-0.04	0.02	0.04	0.03	1.00

Abbreviations—PA: Physical Activity. * $p < 0.05$, ** $p < 0.01$.

Linear regression revealed that participants who took PEAK class during the COVID-19 pandemic had 609.08 more MET-minutes PA than who did not take PEAK classes (95% CI: 137.27, 1080.90; $p=0.01$) and had children living with is also associated with 1191.89 higher MET-minutes compared to who did not (95% CI: -2153.21, -230.57; $p=0.016$) in Table 5. In model 1 that did not include *change in PA*, peak participants did not impact the general health but close to significantly impact emotional wellbeing ($\beta= 7.75$; 95% CI: -0.21, 15.70; $p= 0.056$). In model 2 that included *change in PA*, peak participation was no longer associated with emotional wellbeing. Participants who engaged in more PA experienced better general health ($\beta= 0.005$; 95% CI: 0.0018, 0.008; $p=0.002$) and emotional wellbeing ($\beta= 0.004$; 95% CI: 0.00031, 0.007; $p= 0.033$) during the COVID-19 lockdown (model 2). ‘Did not have kid(s) living with’ participants significantly predicted better general health and emotional wellbeing levels during COVID-19. Finally, the more disruption participants experienced related to COVID-19, the

worse emotional wellbeing they perceived ($\beta = -3.28$; 95% CI: -5.04, -1.43; $p = 0.001$). Males reported better emotional wellbeing during COVID.

Table 5: Regression models evaluating the peak participation predicting change in PA and health

Peak participation predicted change in PA model								
	Estimate	95% CI		<i>p</i>				
Peak Participation	609.08	137.27	1080.90	0.01*				
Covid scale	-46.56	-155.26	62.14	0.40				
Male	15.85	-580.33	612.03	0.96				
Does not have kids live with	-1191.89	-2153.21	-230.57	0.02*				
Change in PA/Peak participation predicted general health model								
	Model 1				Model 2			
	Estimate	95% CI		<i>p</i>	Estimate	95% CI	<i>p</i>	
Change in PA					0.005	0.0018	0.008	0.002**
Peak Participation	5.95	-1.33	13.24	0.108	2.97	-4.23	10.16	0.415
Covid scale	-0.86	-2.54	0.98	0.312	-0.63	-2.24	0.98	0.438
Male	-3.29	-12.5	5.92	0.480	-3.37	-12.15	5.41	0.448
Does not have kids live with	9.23	-5.62	24.07	0.220	15.07	0.45	29.69	0.044*
Change in PA/Peak participation predicted emotional wellbeing model								
	Model 1				Model 2			
	Estimate	95% CI		<i>p</i>	Estimate	95% CI	<i>p</i>	
Change in PA					0.004	0.00031	0.007	0.033*
Peak Participation	7.75	-0.21	15.70	0.056	0.87	-2.62	13.53	0.183
Covid scale	-3.41	-5.24	-1.58	0.000**	-3.28	-5.04	-1.43	0.001**
Male	16.5	6.45	26.55	0.002**	16.61	6.59	26.29	0.001**
Does not have kids live with	12.28	-3.93	28.48	0.14	16.48	0.34	33.16	0.046*

Abbreviations—PA: Physical Activity. * $p < 0.05$, ** $p < 0.01$.

Demographic factors of race, marital status, income, affiliation, and employment status were controlled in the model.

Discussion

The study revealed that participating in virtual PEAK helped to maintain the overall PA level during the COVID lockdown. PEAK participation also helped to maintain emotional wellbeing. Participants who managed to maintain higher level of PA had better general health and emotional wellbeing during the pandemic based on their reporting from the SF-36 questionnaire on general health perceptions.

Not surprisingly, earlier evidence suggested that individuals experienced declined in PA and increased in sedentary time during lockdown. In a study by Ammar and colleagues, isolation was shown to have a negative effect on health behaviors including PA. They also found that

daily sitting time increased from 5 to 8 hours per day (Ammar et al., 2020). In Belgium, exercise promotion helped to increase activity levels in previously high and low active individuals. They also found that drops in PA levels was not due to social reasoning. In fact, they concluded that environmental factor (i.e., threatened health) rather than social influence, accounts for changed exercise levels and patterns during a lockdown (Constandt et al., 2020). The importance of PA to prevent severity of COVID-19 was shown in Vancini and colleagues' study and they also concluded that not only does exercise help with physical health, but to aid individuals in mentally coping through the pandemic (Vancini et al., 2020). As no evident change/decline in PA was reported in our study during COVID-19, it is possible that the participation in remote exercise classes offered by PEAK program helped them to maintain an active lifestyle and positive health behaviors.

One interesting finding of the current study was that the aerobic exercise remained the same but the muscular strengthening exercise for at least 2 days decreased from 62.5% before COVID to 50% during COVID. Due to the restriction and closure of gym and fitness centers, the lack of equipment could possibly explain the decrease in weight training exercise. Further, the Circuit Training, Stretch and Strengthen, and Weight Training were the 2nd-4th most popular PEAK classes (Yoga is the most popular class) which indicates that providing access and knowledge to muscle strengthening exercise could help to maintain weight training exercise during COVID pandemic. The promotion of muscular fitness training might be more challenging during COVID lockdown. However, the virtual weight training classes actively using calisthenic movements might be a possible solution.

The importance of exercise to sustain physical and emotional wellbeing is not to be forgotten as simply an inconvenience or temporary loss in leisure activity. The strong, positive relationship between PA and PEAK also lead to the maintenance of general health and emotional wellbeing in the current study. Those who were most active tended to have higher general health and emotional wellbeing levels. However, we can also expect that the participants who had better health were more likely to maintain higher PA level due to less physical and mental constrains (Dishman et al., 1985; Seefeldt et al., 2002). Those who did not cope well with the stress of the pandemic reported lower levels on the COVID scale scoring and lower levels of PEAK participations. Indeed, the majority of participants reported that PEAK helped them to maintain PA and regulate stress during quarantine. A recent systematic review summarized psychological

impact of quarantine from 24 papers where post-traumatic stress symptoms, confusion, and anger as the most reported negative psychological effects (Ensari et al., 2015). Strong evidence demonstrates that both acute bouts and regular exercises can reduce risk of experiencing anxiety and depression in adult populations since 1990 (Ensari et al., 2015; Mammen & Faulkner, 2013; Rebar et al., 2015; Wegner et al., 2014). Although outdoor activities and indoor exercise facilities have been limited during quarantine, many potential avenues remain for exercising at home without specialized equipment. Several agencies such as ACSM provided examples of resistance training through bodyweight exercises such as squats, push-ups, and lunges or single leg step-ups as well as indoor aerobic activities including dance, jump rope, brisk walks around the house or up and down stairs (Medicine, 2020). Plenty of high-intensity interval training movement including but not limited to jumping jacks, butt kicks, plank jacks, burpees, mountain climbers, flutter kicks, star jumps and do not require much physical space. ACSM also recommended following exercise videos, downloads, or a strength workout application to offset the lack of knowledge or skills to engage in aerobic or strength training at home (Medicine, 2020).

While half of the individuals continued their regular sleep cycle, 18.9% in our study reported sleeping .5 to 2 hours less. Many inferences can be made including stress levels and troubles coping as well as the loss of PA during the day, and increased screen time while working remotely. Another possible explanation would be having children in the home adding in home schooling and additional household management tasks, and, with confinement, an ultimate deterioration of positive attitudes towards home, relaxation, and sleep (Altena et al., 2020). It may also be due to the increased stress levels and inability to cope with the struggles of the pandemic. Those who slept .5 to 2 hours more (27.1%) could be due to saving commuting time.

On the topic of addiction-related behaviors, many studies are parallel to our own with increase in substance use being more prominent than a decrease, with specific attention to mental health decreases. Previously reported in the results section, 28.1% participants increased alcohol intake. In a survey study by Czersler and colleagues, panel surveys conducted in late June of 2020 found that 13.3% of participants started or increased substance abuse use to cope with the stress related to COVID-19 (Czeisler et al., 2020). A similar survey study provided from days 8 to 11 of confinement in France. With nearly 11.4 thousand participants, it was found that more increased than decreases were found in addiction-related habits. For tobacco use, it was a 35.6%

increase, and 24.8% alcohol increase. Decrease in mental health related factors translated to an increase in addiction-related behaviors to cope with confinement stress (Rolland et al., 2020). In Belgium, during the month of April, 3,632 respondents to a survey reported smoking more cigarettes, consuming more alcohol. The odds of alcohol and smoking increase were associated with younger age, more children at home, being nonhealthcare workers, lower education and being technically unemployed related to COVID-19. Boredom, lack of social contacts, loss of daily structure, reward after a hard-working day, loneliness, and conviviality were the main reasons for consuming more of the various substances (Vanderbruggen et al., 2020). Therefore, it is shown in each of the four aforementioned studies that substance use had a higher likelihood to increase during the pandemic COVID-19 in multiple countries including but not limited to the USA, Belgium, and France.

Although the current study is among the first to examine the association of remote exercise classes and well-being during COVID-19 pandemic, there are limitations to the generalizability of the findings. Self-report survey was used in the current study to assess PA and the participants were asked to recall their PA and substance use behaviors before COVID that it is possible the PA levels were overestimated. The majority of current study sample were the university employee with high socioeconomic status whose employment status did not change during COVID. Other vulnerable populations like older adults and youth population might experience a much higher stress level which could lead to a different profile of physical and mental health as well as wellness and substance use behaviors. Last but not least, the participants were recruited in Utah where the Mormon religion has a great influence on substance use behavior which suggests the study results on the substance use could be lower than other population in the U.S. [23].

Conclusions

COVID-19 caused international and local lockdowns that challenged the health and wellness of daily life. Home schooling, telecommuting, and the closure of businesses including gyms and recreational facilities created a dramatic increase in sedentary behavior and reduced PA. PEAK and other virtual exercise classes may resolve that problem while providing a feasible, convenient, and affordable option to continue engaging in structured exercise that were not accessible or feasible in-person during the pandemic due to lockdown restrictions. Further

research should be conducted to determine the effects of similar programs on special populations as well as accessibility to those populations. For example, older adults or disabled individuals without transportation, or immunocompromised individuals unable to appear for in-person group fitness classes. Virtual exercise classes, include personal training sessions via Zoom, virtual reality with Exergames, group exercise classes through programs such as PEAK, or even newly invented interactive equipment including Peloton and Mirror, have become popular prior to the virus outbreak. Such machines and their companion programs are a novel and personal approach to promote exercise that is even more likely now than it was a year ago. Future research should aim to discover the efficacy and effectiveness of these programs.

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