Original Research

Depression among Korean men during COVID-19: social media and physical activity

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Abstract

Background: Due to the COVID-19 pandemic, Korean men are withdrawing from social interactions and feeling depressed due to financial difficulties. This depression can be reduced through physical activities and use of social media for communication. Therefore, this study aims to examine activities effective in reducing depression by analyzing the differences in physical activities and levels of social media addiction, depending on the level of depression. **Methods**: A total of 591 Korean males affected by the COVID-19 pandemic participated in the study. Results were extracted by frequency analysis, descriptive statistical analysis, chi-square test, and *t*-test using SPSS 25.0 (IBM Corp., Armonk, NY, USA). **Results**: Chi-square test, which analyzed differences in demographic characteristics based on the level of depression, revealed significant differences in monthly average family incomes, levels of participation in physical leisure activities, extent of social media usage and kinds of social media used. Significant differences existed in high-intensity physical activities as well as social media non-addiction and addiction depending on the level of depression. **Conclusions**: Since COVID-19 is increasing depression in males, government or health-related institutes need to provide spacious areas to engage in physical activities, which may help reduce suicidal ideation and restore mental health in Korean males. Moreover, there is a need to develop diverse health-related social media contents, which can help reduce depression. Thus, it has been thought that places to perform physical activities and sufficient communication with others on social media can prove helpful in managing depression.

Keywords: COVID-19; Korean men; Depression; Social media; Physical activity levels

1. Introduction

Social distancing measures enforced in response to the prolonged COVID-19 pandemic have greatly impacted people's daily lives. In Korea, indoor facilities such as restaurants, gyms, indoor golf ranges, billiard halls, and badminton courts were closed after 9:00 PM to minimize social contact [1]. Such restrictions have increased feelings of isolation and psychological anxiety among the population [2].

Bueno-Notivol *et al*. [3] suggested that feelings of depression were seven times greater following the COVID-19 pandemic. In this regard, such feelings of depression have been named the "Covid blues" or "Covid depression" in Korea and the Korean government has been making various efforts to reduce this phenomenon [4]. Such feelings of depression can have negative psychological effects on anyone; however, men are particularly vulnerable as they tend not to admit that they are feeling depressed and hence do not receive timely treatment. This can worsen depression [5]. According to Jeon [6], while working from home due to COVID-19, physical activities among Korean people are reducing and obesity is increasing. This increase in obesity could further lead to depression.

Chang [7] stated that depression due to COVID-19 has become severe enough that the suicide rate may increase among Korean men in their 30s and 50s who are experiencing financial hardship. According to research on "The Present State of National Mental Health During the COVID-19" conducted by the Ministry of Health and Welfare in 2021 [8], the risk of suicide among females increased from 9.2% in 2020 to 15.1% in 2021 and it increased from 10.1% in 2020 to 17.4% in 2021. In 2020, only 17.5% of males belonged to a high-risk group for depression, however, it increased to 24.2% in 2021, which means COVID-19 has affected the depression rate of males significantly. Joshua [9] suggested that symptoms of depression can manifest in men through anger, irritability, and aggression, and that emotional stability can be improved through the provision of regular physical activity. In particular, Kim *et al*. [10] explained that Korean males are 44% more likely to be exposed to social isolation than females, because males have weaker relationships with friends or families and their financial difficulties could cause disharmony with families or acquaintances. This suggests that the psychological well-being of Korean men in the wake of the COVID-19 pandemic should be highly prioritized and that there is an urgent need to identify the measures that may reduce their depression.

Meanwhile, physical activity serves to provide emotional stability by improving interpersonal relationships and strengthening social communication during the COVID-19 pandemic [11]. Accessible physical activities that can be performed daily, such as walking and jogging, can improve mood and promote physical and mental recovery, which

helps to actively cope with the challenges of the COVID-19 pandemic [12]. Physical activity can increase the quality of life by positively impacting psychological health, well-being, and cognitive function, leading to the reduction of depressive symptoms [13]. Thus, moderate physical activity may help prevent symptoms of depression and anxiety brought on by the COVID-19 pandemic [14].

Oh [15] stated that the use of smart phones and social media among Korean people is increasing due to the COVID-19 pandemic. This excessive use is leading to social media addiction, which could negatively affect depression, impulsivity, and physical health. Specifically, Yeon [16] revealed that 25% of people who excessively use social media, such as Facebook, Instagram, and Twitter, are 2.7 times more likely to feel depressed than average users.

In this regard, the Korea Health Promotion Institute [17] suggested physical activity and interpersonal communication through social media as a strategy to mitigate depression and anxiety due to social isolation during the COVID-19 pandemic, considering that 40.7% of Koreans had reported feelings of depression and anxiety in response to restrictions on social gatherings. Singh *et al*. [18] conducted a study among elderly people with mild depression to understand the effect of high and low-intensity resistance training on combating depression. They demonstrated that high-intensity training was more effective in improving depression than low-intensity training. This result was supported by Kanamori *et al*. [19], who also found high-intensity physical activities to be more effective in reducing depression among the Japanese elderly than low-intensity physical activities. Accordingly, this study examined if high-intensity physical activities could. reduce depression among Korean adults.

Consequently, social media usage has increased due to social distancing measures as people seek connection and social stimulation through the only means available [20]. A general increase in social media usage was observed throughout the COVID-19 pandemic, with text communication through Facebook, Instagram, and WhatsApp increasing by 70% [21]. Recent studies have exhibited that sharing of positive health information through social media to reduce negative emotions and feelings of social disconnection, may lead to increase in healthy behaviors [22].

Correa *et al*. [23] revealed that while people tended to prefer receiving news through traditional outlets, they accepted information more meaningfully when it came from social media. Similarly, Houston and Franken [24] reported that following the psychological trauma from the 2011 tornado in Joplin, Missouri, USA, increased rates of communication and information sharing through social media helped improve coping behavior. Similarly, connecting with friends and family can lower anxiety in the face of difficult situations [25]. Furthermore, Galea *et al*. [26] revealed that acquiring information through audio or video content accessible through social media was a better alternative compared to the typically-used delivery systems by the government such as e-mail or text message. As such, communication through social media may help restore mental health in a post-COVID-19 world [27]. Therefore, it is necessary to investigate whether interpersonal communication using social media is indeed effective for Korean men who are experiencing depressive symptoms due to social isolation or financial strain in the wake of COVID-19.

As mentioned earlier, physical activity and interpersonal communication through social media can reduce depression. It is not clear, however, what specific kinds of activities may effectively reduce depression among Korean men facing financial and social challenges due to the COVID-19 pandemic. This study aims to provide preliminary data for improving mental health in men by identifying the kinds of physical activity and social media engagement that is most effective for alleviating depression.

The following hypotheses were established:

Hypothesis 1: There are differences in demographic characteristics according to the level of depression experienced by Korean men during the COVID-19 pandemic.

Hypothesis 2: There will be differences in physical activity levels according to the level of depression experienced by Korean men during the COVID-19 pandemic.

Hypothesis 3: There will be differences in extent of social media usage or behaviors of social media addiction according to the level of depression experienced by Korean men during the COVID-19 pandemic.

2. Materials and methods

This study aimed to identify activities that are effective in alleviating depression among Korean men by examining differences in demographic information, physical activity levels, and social media usage corresponding to the differing levels of depressive symptoms. Data was collected over two periods: for seven days between November 13, 2020, and November 19, 2020, and for 11 days between September 3, 2021, and September 14, 2021.

2.1 Study participants

The survey targeted Korean adult males aged 19 to 65 years. For the first survey, 275 participants were recruited during the seven-day period by Embrain (EMBRAIN Corp., Gangnam, SEOUL, KOREA), a specialized survey firm. For the next survey, conducted during the 11-day period, 316 participants were recruited by Panelnow (PanelNow Corp., jung-gu, SEOUL, KOREA). A total of 591 participants joined this study. Informed consent was received from the participants before the survey. If the participants chose their gender as female, the survey was terminated immediately in order to include only male participants in the survey.

The sample size was based on standards by Comrey and Lee [28], which scaled sample size with the potential validity of a research study (50 = very poor, 100 = poor, 200 = fair, 300 = good, 500 = very good, 1000 or more = excellent). The sampling method used was convenience sampling, a type of non-probability sampling. The questionnaires were self-evaluative.

2.2 Measurement tools

2.2.1 Demographic characteristics

Five demographic characteristics were measured through the questionnaire—age, average monthly household income, highest educational degree, physical activity level, and whether participants had a physical activity companion and the type of companion. The data were collected using the 2019 National Leisure Activity Survey conducted by the Ministry of Culture, Sports, and Tourism [29].

2.2.2 Depression diagnostic scale

To measure the level of depression experienced by Korean men, the Health Questionnaire-9 (PHQ-9), which has been used in previous studies [30,31], was revised for this study upon expert consultation with a professor and a doctoral researcher in sports sociology. This scale includes a nine-item depression diagnostic tool that outlines the criteria for diagnosing mental disorders, including major depressive disorder [32]. Items on the scale range from 0 ("never") to 3 ("almost daily"). The total score for the PHQ-9 scale is 27, with the standard scores classifying symptoms of depression as being minimal (0–4), mild (5–9), moderate (10–14), and severe ($\geq$15). A score above 10 is suggestive of depression [26]. The Cronbach's α of the PHQ-9 was 0.915, indicating the reliability of the measurement tool.

2.2.3 Social media addiction scale

The Bergen Facebook Addiction Scale (BFAS), revised by Andreassen *et al*. [33], was revised upon expert consultation with a professor and a doctoral researcher in sports sociology for use as a social media addiction scale. The types of social media platforms included in the questionnaire involved those that were used widely in Korea, such as YouTube, Facebook, Twitter, Instagram, and KakaoTalk.

The questionnaire consisted of a total of six questions, for which a total BFAS score above 19 indicated a high degree of social media addiction [34]. The measurement tool comprised a five-point Likert scale ranging from 1 ("very rarely") to 5 ("very often"). The Cronbach's α of BFAS was 0.917, indicating the reliability of the measurement tool.

Concerning the Topline Questionnaire used in a study by Zhao & Zhou [35], questions about the extent of social media usage comprised of two questions: (1) regarding the extent of social media use and (2) the type of social media platform used most frequently.

2.2.4 Measurement of physical activity levels

A shortened version of the International Physical Activity Questionnaire (IPAQ) was used to measure the participants' physical activity levels. Furthermore, following the IPAQ guidelines, the durations of high-intensity and moderate-intensity physical activity were converted to metabolic equivalent of task (MET) values for analysis, which indicate energy consumption at rest.

The MET is calculated as follows: 8.0 METs and 4.0 METs for high-intensity and moderate-intensity physical activity, respectively, were multiplied by the duration of each activity and the weekly physical activity levels were derived and scored [36]. For example, METs/hours/week = amount of physical activity (time/week) $\times$ duration of physical activity (hours/time) $\times$ intensity of physical activity.

Participants were asked to provide the frequency and duration of physical activity classified into high-intensity, moderate-intensity, and walking (suggesting low-intensity) for each session lasting for a minimum of 10 minutes in the previous week. High-intensity physical activity included not only sports but also daily activities such as running, hiking, biking at a high speed, and carrying heavy objects. Moderate-intensity physical activity referred to activities such as swimming, tennis, and hiking. The World Health Organization (WHO) has recommended at least 150 minutes of moderate-intensity, or 75 minutes of high-intensity physical activity per week for adults 18 years or older [37].

2.3 Data processing

The data were processed through coding and data cleaning and analyzed using SPSS version 25.0 (IBM Corp., Armonk, NY, USA). The procedure for data processing was as follows. First, frequency analysis and descriptive statistical analysis were performed on the participants' demographic characteristics. Second, the skewness and kurtosis values for the PHQ-9 and BFAS scales were calculated pertaining to West *et al*. [38]. The skewness and kurtosis values for the PHQ-9 and BFAS scales were –0.190–1.282 and –1.016–0.749, respectively, forming a normal distribution. Third, the reliability of the measurement tool was examined using Cronbach's α. Fourth, a *t*-test was performed to identify the difference in demographic characteristics according to the level of depression to explore Hypothesis 1. Fifth, a chi-square test was performed to identify the difference in levels of physical activity and social media addiction according to the level of depression. The effect size was analyzed with reference to Cohen [39], who defined a d-value of 0.2 as a small effect, 0.5 as a medium effect, and 0.8 as a large effect.

3. Results

The participants' demographic characteristics are exhibited in Table 1. A total of 591 men participated in this study and the average age of the participants was 44.03 years (SD = 13.458). Specifically, 118 participants were in

their 20s (20.0%), 119 were in their 30s (20.1%), 118 were in their 40s (20.0%), 117 were in their 50s (19.8%), and 119 were aged between 60–65 (20.1%). The highest average monthly household income was 2,010,000\–4,000,000\, as observed in 206 participants (34.9%). The most frequent highest educational degree was a four-year university degree, observed in 337 participants (57.0%).

First, to verify Hypothesis 1, chi-square test was carried out. Significant differences were identified in monthly average family incomes (x^2 = 14.428, p = 0.006), levels of participation in physical leisure activities (x^2 = 12.014, p = 0.014), extent of social media usage (x^2 = 11.583, p = 0.021) and kinds of social media used (x^2 = 11.276, p = 0.024) there was a significant differences in.

Table 2 summarizes the results of a t-test analysis regarding the differences in levels of physical activity and extent of social media addiction according to the PHQ-9 level of depression, used to verify hypotheses 2 and 3. Specifically, the results demonstrate significant differences in high-intensity physical activity (t = –2.436, p = 0.015), social media non-addiction (t = –2.829, p = 0.005), and social media addiction (t = –5.757, p = 0.000). No significant difference was observed in low-intensity physical activity.

4. Discussion

This study aimed to examine whether there is a difference in demographic characteristics, physical activity levels, and social media use according to the reported level of depression among Korean men in the wake of the COVID-19 pandemic. The findings are summarized as follows.

First, the demographic characteristics of Korean men were analyzed using a chi-square test, based on their reported depression levels. Our results indicate significant differences among average monthly household income and social media use. Difficulties in school, work, and personal finances brought about by the prolonged social restrictions placed due to COVID-19 have led to high levels of depression [40]. Additionally, Pierce et al. [41] reported that young people tend to suffer higher levels of psychological distress due to unemployment, reduced income, and layoffs compared to older people.

Furthermore, a study by Lee [42] revealed that Korea saw a dramatic increase in suicide rates. This study also revealed that men suffer from depression severe enough to contemplate suicide, whereas women are more likely to report feeling depressed and express this more openly compared to men. Such states of depression can be attributed to a decline in mental health due to job loss and debt, exacerbated by the prolonged COVID-19 pandemic [43]. In this regard, a new term, "n-po generation" has appeared in Korea, similar to the term, "Ikea generation" [44]. The "n-po generation" refers to a generation of people who have given up on dating, marriage, becoming a homeowner, owning property, building a career, fostering relationships, and the like. As such, the prolongation of the COVID-19 pandemic

has led people to give up on basic aspects of life, which in turn, negatively affects individuals' mental states. Therefore, the government should play an active role in establishing measures to reduce depression through fundamental interventions that can alleviate the economic struggles of young adults.

Second, an analysis of the difference in physical activity levels according to levels of depression among Korean men revealed a significant difference in levels of high-intensity physical activity. This indicates a high frequency of high-intensity physical activity among men who may be feeling depressed. Many studies have suggested that participation in moderate physical activity can effectively reduce symptoms of depression [45–47]. Nevertheless, the findings of this study demonstrate no significant difference for moderate-intensity physical activity, revealing a significant difference only for high-intensity physical activity.

Characteristically, Koreans are conscious of the opinions of others [48]. In particular, taking pictures following a vigorous workout session and posting them on Instagram has become a trend among Korean men in their 20s and 30s [49]. Regarding this phenomenon, Chung [50] describes the recent attribution of value to external appearances, such as a fit body, which has led to those who do not fit these bodily standards feeling depressed. In this way, an increase in the number of people wishing to gain muscle or change their appearance through dieting may have led to high levels of depression in those engaging in high-intensity physical activity.

It is worth noting that men who participate in high-intensity physical activity regularly are most likely athletic or sporting enthusiasts. Due to restrictions on the use of facilities such as gyms, participation in regular physical activity became increasingly difficult [51]. Thus, Korean men have been purchasing equipment in order to engage in physical activity at home [52]. Despite this, the amount of physical activity at home may be insufficient compared to what participants may have been used to at the gym [53].

According to Dumitru et al. [54], the desire to engage in physical activity is more commonly observed in men than women, and men become stressed if they are not able to exercise. Moreover, Alcaraz-Ibáñez et al. [55] suggested that one may feel depressed when their physical activity needs are not fulfilled. In a similar manner, Korean men have reported feeling higher levels of depression as their physical activity levels decreased due to restricted access to spaces in which they could engage in physical activity. As such, it is necessary to establish a strategy to enable participation in physical activity in a spacious location, while maintaining social distancing [56].

Lin et al. [57] reported that men who engaged in high-intensity physical activity demonstrated lower levels of depression. In this study, however, there were contradictory findings as higher levels of depression were observed in those who engaged in high-intensity physical activity.

Table 1. Participants' demographic and personal characteristics (N = 591).

Variable	Characteristic	Total, N (%)	PHQ-9 score ≥10 (N = 425)	PHQ-9 score <10 (N = 166)	x^2	p-value
		591	Frequency (%)			
Age	20–29	118 (20.0)	85 (72.0)	33 (28.0)		
	30–39	119 (20.1)	80 (67.2)	39 (32.8)		
	40–49	118 (20.0)	78 (66.1)	40 (33.9)	8.728	0.068
	50–59	117 (19.8)	85 (72.6)	32 (27.4)		
	Under 65	119 (20.1)	97 (81.5)	22 (18.5)		
Average monthly household income	Under 1,000,000 ₩	28 (4.7)	16 (57.1)	12 (42.9)		
	1,010,000~2,000,000 ₩	45 (7.6)	23 (51.1)	22 (48.9)		
	2,010,000~4,000,000 ₩	206 (34.9)	153 (74.3)	53 (25.7)	14.428	0.006
	4,010,000~6,000,000 ₩	168 (28.4)	125 (74.4)	43 (25.6)		
	Over 6,010,000 ₩	144 (24.4)	108 (75.0)	36 (25.0)		
Highest education degree	Highschool	52 (8.8)	35 (67.3)	17 (32.7)		
	College (1–3-year degree)	63 (10.7)	48 (76.2)	15 (23.8)		
	University (4-year degree)	337 (57.0)	242 (71.8)	95 (28.2)	1.416	0.841
	Master's degree	95 (16.1)	67 (70.5)	28 (29.5)		
	Doctoral degree	44 (7.4)	33 (75.0)	11 (25.0)		
Type of physical activity companion	Alone	278 (47.0)	208 (74.8)	70 (25.2)		
	Family	195 (33.0)	134 (68.7)	61 (31.3)		
	Friend	82 (13.9)	56 (68.3)	26 (31.7)	4.451	0.338
	Colleague	17 (2.9)	11 (64.7)	6 (35.3)		
	Acquaintance (from a religious group, etc.)	19 (3.2)	16 (84.2)	3 (15.8)		
Frequency of physical activity	Everyday	67 (11.3)	47 (70.1)	20 (29.9)		
	Few times a week	314 (53.1)	235 (74.8)	79 (25.2)		
	2–3 times a month	130 (22.0)	95 (73.1)	35 (26.9)	12.435	0.021
	Once a month	36 (6.1)	17 (47.2)	19 (52.8)		
	Once every few months	44 (7.4)	31 (70.5)	13 (29.5)		
Frequency of social media use	All day	82 (13.9)	52 (63.4)	30 (36.6)		
	Once a day	235 (39.8)	169 (71.9)	66 (28.1)		
	Once every 2–3 days	124 (21.0)	82 (66.1)	42 (33.9)	11.583	0.021
	Once every 4–5 days	44 (7.4)	36 (81.8)	8 (18.2)		
	Once a week	106 (17.9)	86 (81.1)	20 (18.9)		
Type of social media platform used	KakaoTalk	158 (26.7)	125 (79.1)	33 (20.9)		
	YouTube	296 (50.1)	208 (70.3)	88 (29.7)		
	Instagram	56 (9.5)	32 (57.1)	24 (42.9)	11.276	0.024
	Facebook	73 (12.4)	55 (75.3)	18 (24.7)		
	Twitter	8 (1.4)	5 (62.5)	3 (37.5)		

There were no significant differences in moderate-intensity physical activities depending on the level of depression. This is because more males tend to continue moderate-intensity physical activities than females from the past to the present [57]. Particularly, according to Jeon [58], men in their 40s have menopausal symptoms and experience a fall in masculinity and an increase in weight, because of a decrease in testosterone. Therefore, they may feel depressed by physical inconvenience, regardless of physical activities. Absence of significant differences in moderate-intensity physical activities results from these personal difficulties faced by Korean males. As such, various social problems may lead to a reduction in physical activity levels in men. Therefore, establishing measures for men to participate in physical activities with COVID-19 restrictions in place can allow Korean men to overcome feelings of depression.

Third, an analysis of the extent of social media addiction according to the levels of depression among Korean men indicated feelings of depression for both "social

Table 2. An analysis of levels of physical activity and social media addiction according to the PHQ-9 level of depression (N = 591).

Variable		Mean (SD)		*t*-value	*p*-value	Effect Size (d)
		PHQ-9 score ≥10 (N = 425)	PHQ-9 score <10 (N = 166)			
Physical activity	High-intensity physical activity	790.889 (1972.088)	1264.964 (2477.867)	–2.436	0.015	–0.212
	Moderate-intensity physical activity	588.207 (1124.060)	669.228 (1136.868)	–0.785	0.433	–0.072
Social media	Non-addiction to social media	11.372 (3.852)	14.045 (3.997)	–5.757	0.000	–0.681
	Addiction to social media	21.326 (2.089)	22.346 (2.527)	–2.829	0.005	–0.440

The *p*-value was analyzed using an independent *t*-test.

media non-addiction" and "social media addiction" groups. According to the "2021 Social Media Market and Current Status Analysis Report" published by DMCREPORT [59], 89% of the Korean population uses social media. The usage rate in Korea is high compared to the global population. Most of the Korean citizens use social media platforms such as YouTube, which is supported by the findings of this study, indicating that YouTube has the greatest influence among the various social media platforms.

A study by Son and Heo [60], which explored feelings of helplessness and loneliness arising from social media use in Koreans during the COVID-19 pandemic, demonstrated that feelings of helplessness and loneliness were felt more strongly when an increased amount of time was spent on social media. On the other hand, the use of social media platforms made for social communication, such as KakaoTalk and Instagram, reduced loneliness. Additionally, more time spent on YouTube during the COVID-19 lockdown reduced viewers' sleep time [61] and subsequently increased depressive symptoms [62]. Thus, the appropriate use of social media, which includes the right kinds of applications and platforms as well as implementing the right degree of use, may be an effective method to improve depression in response to the COVID-19 pandemic. Examples include promoting personal happiness through YouTube and social communication through KakaoTalk and Instagram.

Further, social media is not simply used to maintain a social network with acquaintances. It can enable the provision of emotional support for those who are struggling due to the pandemic and provide support and encouragement for particular groups. For example, medical staff and frontline workers, who experienced high levels of stress, trauma, and isolation, received support through social media groups, which helped them overcome the psychological stress of COVID-19 [63]. Ongoing social communication, including through social media, can lead to reduced stress, positive mood, and promotion of social interactions [64]. Such active use of social media can sustain communication

with friends and family and is effective in reducing isolation, and boredom, and ultimately tackle anxiety and other prolonged mental issues due to COVID-19 [65]. Therefore, the development of various social media content that aims to enhance communication among users at the national and local level may increase mental stability and reduce depression. This can be compared to social media use that simply connects close acquaintances. Our findings suggest that wider and broader social connections may address issues of depression in this way.

The limitations of this study are as follows: first, this is a cross-sectional study, which made it difficult to control for individual psychological and social circumstances unrelated to COVID-19 prior to the survey. Therefore, in the future, a longitudinal study controlling for individual situations may facilitate higher validity and reliability of findings. Second, this study was conducted online using a professional survey company, which may have led to differences in the completion of the questionnaire depending on the participants' computer skills. Therefore, a brief training on questionnaire completion may lead to more consistent results. Third, as this study used a questionnaire using the IPAQ scale to measure physical activity levels, the results may not have reflected the participants' usual physical activity levels as individual social, physical, and psychological states were not controlled for. Therefore, more detailed results may be obtained if the study was conducted among participants with similar lifestyles.

5. Conclusions

In this study, frequency analysis, descriptive statistical analysis, chi-square test and *t*-test were performed to understand the differences in descriptive statistic characteristics, physical activities and extent of social media addiction depending on the level of depression among Korean males in the COVID-19 situation.

When analyzing differences in demographic characteristics depending on the level of depression, there existed

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differences in monthly average family incomes, levels of participation in physical leisure activities, levels of social media usage, and kinds of social media used. There were significant differences in high-intensity physical activities, social media non-addiction, and social media addiction depending on the level of depression. As the continuance of COVID-19 increases depression in males, government or health-related institutes need to provide spacious areas to engage in physical activities to help reduce suicidal ideation and restore mental health in Korean men. Moreover, there is a need to develop diverse health-related social media content to reduce depression by actively using social media that are often used by males. Therefore, it is ideated that provision of spaces to perform physical activities in their entirety and sufficient communication with others on social media can be helpful in combating depression.

Author contributions

Conceptualization—YJK, ESK; Methodology—YJK, ESK. Verification—YJK, ESK; Official analysis—YJK, ESK; Survey—YJK, ESK; Data curation—YJK, ESK; Writing—Original draft—YJK; Writing—Revisions—YJK and ESK.

Ethics approval and consent to participate

This study obtained approval of the Chung-Ang University Research Ethics Board, in accordance with the 'Helsinki Declaration' enacted in 1964 (041078-202009-HRSB-259-01). Informed consent was received from the participants before the survey.

Conflict of interest

The authors declare no conflict of interest.

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