# The Effect of Home Quarantine and Social Isolation on Physical Activity Level, and Its Effects on Anxiety and Depression in University Students in COVID-19 Pandemic: A Cross-Sectional Study

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**Abstract**

**Aim:** The aim of this study was to investigate the effects of a lack of physical activity (PA) due to long-term home isolation, on individuals' depression and anxiety levels and the relationship between these factors.

**Method:** 327 young adult university students were included in this study. The short form of the International Physical Activity Questionnaire was used to determine PA levels, the Beck Depression Inventory was used for depression levels, and the Beck Anxiety Inventory was used for anxiety levels of individuals.

**Results:** It was determined that 60.2% of the students had an inadequate FA level, 67.7% of the students experienced mild to severe depression, and 25% of the students experienced moderate to severe anxiety. Also, it was observed that the frequency of depression was higher in participants with an insufficient PA level, and this difference was statistically significant ($p<0.05$). The number of participants with insufficient PA at all anxiety levels was higher than that of those with sufficient PA.

**Conclusion:** Due to the COVID-19 pandemic, individuals' FA levels decreased significantly and this decrease was significantly associated with an increase in individuals' depression levels. During COVID-19 pandemic process, lifestyle changes occurred in individuals, a more sedentary life was started in young adults, and this situation has negative effects on psychological factors.

**Keywords:** Anxiety, COVID-19, depression, physical activity level.

## COVID-19 Pandemisinde Üniversite Öğrencilerinde Ev Karantinası ve Sosyal İzolasyonun Fiziksel Aktivite Düzeyi Üzerine Etkisi ve Bunun Kaygı ve Depresyon Üzerine Etkisi: Kesitsel Bir Çalışma

**Öz**

**Amaç:** Bu çalışmanın amacı, uzun süreli ev izolasyonuna bağlı fiziksel aktivite (FA) eksikliğinin bireylerin depresyon ve anksiyete düzeylerine etkisini ve bu faktörler arasındaki ilişkiyi araştırmaktır.

**Yöntem:** Bu çalışmaya 327 genç yetişkin üniversite öğrencisi dahil edildi. Bireylerin FA düzeylerini belirlemek için kısa form Uluslararası Fiziksel Aktivite Anketi, depresyon düzeyleri için Beck Depresyon Envanteri ve anksiyete düzeyleri için Beck Anksiyete Envanteri kullanıldı.

**Bulgular:** Öğrencilerin %60,2'sinin yetersiz FA düzeyine sahip olduğu, öğrencilerin %67,7'sinin hafif-ağır depresyon yaşadığı ve %25'inin orta-şiddetli düzeyde anksiyete yaşadığı belirlendi. Ayrıca FA düzeyi yetersiz olan katılımcılarda depresyon sıklığının daha yüksek olduğu ve bu farkın istatistiksel olarak anlamlı olduğu görüldü ($p<0.05$). Tüm anksiyete düzeylerinde yetersiz FA'sı olan katılımcı sayısı, yeterli FA düzeyine sahip olanlardan daha fazlaydı.

**Sonuç:** COVID-19 pandemisi nedeniyle bireylerin FA seviyeleri önemli ölçüde azaldı ve bu azalma, bireylerin depresyon düzeylerindeki artışla anlamlı olarak ilişkiliydi. COVID-19 pandemi sürecinde bireylerde yaşam tarzı değişiklikleri meydana gelmiş, genç yetişkinlerde daha hareketsiz bir yaşama geçilmiştir ve bu durum psikolojik faktörleri olumsuz etkilemektedir.

**Anahtar Sözcükler**: Anksiyete, COVID-19, depresyon, fiziksel aktivite düzeyi.

## Introduction

COVID-19 (Coronavirus Disease 2019) is a highly contagious disease during the incubation period which is caused by Sars-Cov-2 (Severe Acute Respiratory Syndrome Coronavirus 2)[1]. COVID-19 started like a viral outbreak in Wuhan city of China's central Hubei province in December 2019[2]. A group of about 40 pneumonia cases of unknown etiology was reported, some of the patients were sellers in the local Huanan Seafood market. Chinese officials began working together with the World Health Organization (WHO), and the etiological agent was soon after determined to be a new virus and was named Novel CoronaVirus (2019-nCoV). Within a few weeks, the infection spread rapidly around the world[3]. Looking at the countries where this outbreak has spread, WHO declared it as an Internationally Important Public Health Emergency on January 30, 2020[3,4]. On February 11, WHO announced a name for the novel coronavirus disease: COVID-19. Because nearly 114 countries had been affected by that time, on March 11, WHO declared COVID-19 a pandemic.

The first COVID-19 case seen in Turkey was a 44-year-old male, who was admitted to the hospital on March 9, 2020. The first death related to COVID-19 disease occurred on March 17, 2020. Many measures were taken such as restricting flights to certain countries, gradually suspending all flights and banning foreign nationals from entering the country, observing the isolation applied for 14 days and symptoms of people at risk, who came from certain countries. People with chronic diseases were given administrative leave from work and a temporary suspension was applied to education on campus at schools and to rest areas and entertainment venues that were open to the public. Measures were taken for penal institutions, rest homes, dormitories, public transportation vehicles, and intercity buses. In addition to these, a curfew was applied on weekends. In

accordance with the pandemic plans, actions covering many sectors were applied, and preventive actions were carried out concerning the whole society[5].

In the COVID-19 outbreak, strict isolation rules and strategies must be applied to prevent the spread of the virus. As a result of isolation of individuals with fear of virus contagion, stigma, quarantine, and misinformation (infodemic), chronic stress can occur and may pose risk factors for depression and anxiety[6]. It is known that chronic stress is an effective immune modulator and directly affects the possibility of infection[7]. In addition, chronic stress causes structural and functional changes in the brain, leading to the differentiation of the social behavior of the individual, and this affects the capacity of the person to cope with stressful conditions during the pandemic[8]. The interaction of stressful situations associated with COVID-19 with chronic stress affects the way individuals cope with stress and by causing the immune system capacity to deteriorate, creates a vicious circle[9].

There is consensus that the COVID-19 pandemic affects the health of individuals not only physically but also mentally, and also affects the well-being of individuals[10,11]. From a psychopathological perspective, for mental health professionals, the COVID-19 pandemic is a new type of stressor or form of trauma[12]. Restriction measures taken depending on the pandemic - quarantine, self-isolation, and social distance- can adversely affect the mental health of individuals. Individuals' concerns about their health of themselves and their loved ones and the sense of uncertainty about the future, may cause anxiety, fear and depression[13].

Isolation strategies restrict individuals' access to PA, especially if applied outdoors or in groups. After the measures taken to control the pandemic, a significant decrease in non-residential mobility has been seen all over the world[14] and this reflects a general decrease in PA. It is emphasized that PA has strong beneficial effects on the depression and anxiety levels of individuals, especially when it is performed outdoors or in a group. On the other hand, chronic stress factors can reduce individuals' readiness to do PA and cause another vicious circle to occur[15].

A recent study conducted with university students before COVID-19 pandemic stated that 23.3% of students had insufficient physical activity (PA) levels, 48.6% had low levels of sufficient PA, and 28.1% had sufficient PA levels[16]. In another study, it was stated that 35.7% of university students had normal, 34.4% had mild-moderate, and 29.9% had severe and very severe anxiety levels; also, 39.8% of students had normal, 37.1% had mild-moderate, and 23.1% had severe and very severe depression levels[17]. Another recent study conducted with university students in Turkey stated that during the pandemic, the majority of students (69.7%) felt anxious[18]. The difference of this study from other studies is to determine the effect of the change in PA level on the depression and anxiety levels of individuals, and to contribute to the literature.

The aim of this study is to determine the change in PA levels due to long-term home isolation and its effects on individuals' depression and anxiety levels and the relationship between these factors. Hypothesized that long-term home isolation will decrease the PA levels of individuals, which in turn will increase their depression and anxiety levels.

## Material and Method

This study was carried out in the Istanbul Gelisim University Vocational School of Health Services between July 2020-August 2020, in order to investigate the effects of home quarantine and social isolation -which applied to prevent the risk of contamination in the COVID-19 pandemic- on physical activity level (PAL), anxiety and depression in university students.

The Istanbul Gelisim University Ethics Committee found this study appropriate in terms of medical ethics, with the decision numbered 2020-19-05 taken on 17.07.2020.

### Participants

Participants were reached by creating a survey in the Advancity Learning Management System (ALMS) (https://lms.gelisim.edu.tr/), an online education platform belonging to Istanbul Gelisim University. The survey was made available to students from 9 different departments within the Istanbul Gelisim University Vocational School of Health Services. The inclusion criteria were to be a student at Istanbul Gelişim University and to be between the ages of 18-25. Exclusion criteria was not volunteering to participate in the study. 327 young adult students who volunteered to participate in the study and completed the survey completely were included in the study. A detailed consent form was available at the beginning of the survey, and the survey did not start until the participants had read and approved it. The details of the recruitment of the participants are given in Figure 1.

**Figure 1.** Flowchart of recruitment
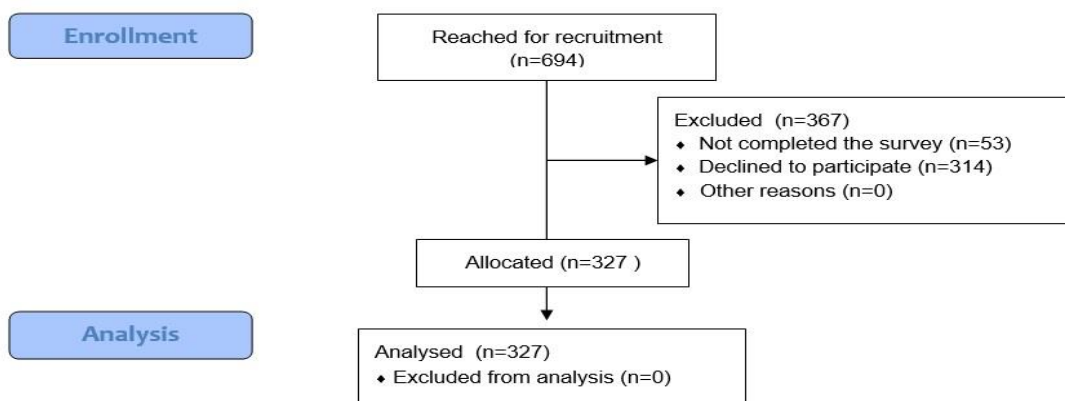
**Assessment Tools**

**Sociodemographic Evaluation**

Age, weight, height, smoking, alcohol use, and exercise habit information were asked of all participants in the study. If participants were smoking and using alcohol regularly, they checked the answer "yes", If they quit or never used before, they checked "no". To determine a regular exercise habit, the question asked as "Are you doing exercise at least 3 days a week and 30 min each session?", and the options were "yes" or "no". And Body Mass Index (BMI) of all individuals were calculated.

**Physical Activity Level Assessment**

PAL of individuals was questioned with the Turkish version of the short form of "International Physical Activity Questionnaire (IPAQ)". This questionnaire was developed to determine the PALs and sedentary life habits of individuals, and the Turkish validity and reliability study of the questionnaire was conducted by Saglam et al. And test-retest reliability coefficient of this questionnaire was found $r_s$= .69 in a their study[19].

The questionnaire consists of 7 questions to determine severe and moderate PA duration in the last seven days. While evaluating the activities of individuals, it is accepted as a criterion to do each activity for at least 10 minutes. The "MET-min/week" score is obtained by multiplying "metabolic equivalent (MET) value", "day" and "minute" for each activity level.

MET energy values generated for IPAQ are as follows; walking=3.3 MET, moderate PA=4.0 MET, intense PA=8.0 MET. In addition, categorical classification made with the numerical data obtained is; PAL is insufficient=0<Total MET-min/week<600, PA is low level sufficient=600≤Total MET-min/week<3000, PAL is sufficient=3000≤Total MET-min/week[20].

**Depression Assessment**

Depression level of individuals was determined by using "Beck Depression Inventory" of which Turkish reliability and validity study conducted by Hisli[21]. In a previous study this inventory's reliability coefficient was found excellent (.92)[22]. There are 21 items in the inventory about how individual has been feeling in the last seven days. And for each item there are 4 options ranging in intensity (0= the least intense, 3= the most intense). The total score ranges from 0-63, and 0-9 points define minimal, 10-16 points define mild, 17-29 points define moderate, and 30-63 points define severe depressive levels[23].

**Anxiety Assessment**

"Beck Anxiety Inventory" was used to determine the level of anxiety in individuals of which Turkish reliability and validity study was performed by Ulusoy et al.[24]. In their study they found that reliability coefficient of this inventory is .93[24]. There are 21 categories in the inventory about how individual has been feeling in the last week. And in each category there are 4 options scored

between 0 (not at all) and 3 (severely) points. The total score of the inventory is between 0-63. 0-17 points indicate low anxiety level, 18-24 points indicate moderate, and 25-63 points indicate high anxiety level[25].

## Statistical Analysis

For the statistical analysis of the data, SPSS 24.0 version of the statistical program "SPSS (Statistical Package for Social Sciences)" was used. "Kolmogorov-Smirnov Normality Test" was used to determine the conformity of the data to normal distribution. "Chi-Square Test" was used to analyze the difference and relationship between categorical variables. And "Logistic Regression" analysis was performed. "Pearson Correlation" and "Partial Correlation" tests were used to analyze the reliationship between variables. For statistical significance, the data were interpreted at the $p < 0.05$ level.

## Results

Sociodemographic characteristics of the participants included in this study are given in Table 1. 281 (81.7%) female and 63 (18.3%) male students were included in the study. Participants showed normal distribution with 21.3±2.54 mean age and 22.10±3.61 mean BMI. Participants' range of age was 18-43 and BMI was 14.69-37.64. While 92 (26.7%) participants were smoking, 252 (73.3%) of them were not smoking. While 58 (16.9%) participants were using alcohol, 286 (83.1%) of them did not use alcohol. It was observed that 132 (38.4%) participants had regular exercise habits before the COVID-19 pandemic, and 212 (61.6%) did not have regular exercise habits.

**Table 1.** Sociodemographic characteristics of participants

|  |  | N/% |
|---|---|---|
| **Gender (N/%)** | Female | 281 / %81.7 |
|  | Male | 63 / %18.3 |
| **Age (Mean±SD)** |  | 21.03±2.54 |
| **BMI (Mean±SD)** |  | 22.10±3.61 |
| **Smoking (N/%)** | Yes | 92 / %26.7 |
|  | No | 252 / %73.3 |
| **Alcohol (N/%)** | Yes | 58 / %16.9 |
|  | No | 286 / %83.1 |
| **Exercise (N/%)** | Yes | 132 / %38.4 |
|  | No | 212 / %61.6 |

BMI: Body Mass Index, SD: Standart Deviation

PA, depression and anxiety levels of the participants are given in Table 2. When PALs of the participants were examined, it was found that 207 (60.2%) had insufficient PAL, 123 (35.8%) had low level sufficient PAL and 14 (4.1%) had sufficient PAL. Also the mean PA MET value of the sample was 799.37±1004.25 (Min=0, Max=7740) and did not show normal distribution. When participants' anxiety levels were examined, it was found that 258 (75%) had low, 34 (9.9%) had moderate and 52 (15.1%) had high anxiety levels. And the mean anxiety value of the sample was 13.24±11.88 (Min=0, Max=59) and did not show normal distribution. When participants' depression levels were examined, it was seen that 111 (32.3%) had minimal depression, 94 (27.3%) had mild depression, 104 (30.2%) had moderate and 35 (10.2%) had severe depression. In addition the mean depression value of the sample was 15.20±9.70 (Min=0, Max=47) and did not show normal distribution.

**Table 2.** PAL, anxiety and depression prevalence of participants

|  |  | N/% |
|---|---|---|
| **PAL** | Insufficient | 207 / %60.2 |
|  | Low Level Sufficient | 123 / %35.8 |
|  | Sufficient | 14 / %4.1 |
| **Anxiety** | Low | 258 / %75 |
|  | Moderate | 34 / %9.9 |
|  | High | 52 / %15.1 |
| **Depression** | Minimal | 111 / %32.3 |
|  | Mild | 94 / %27.3 |
|  | Moderate | 104 / %30.2 |
|  | Severe | 35 / %10.2 |

PAL: Physical Activity Level

When the relationship between depression and PAL of the participants was examined, it was observed that the frequency of depression was higher in participants with insufficient PAL, and this difference was statistically significant (p <0.05). As a result of the association test, it was found that there is a moderate effect between depression and PA (Table 3).

**Table 3.** Relationship between participants' PAL and anxiety and depression values

| | | PAL Insufficient (N = 207) | PAL Low Level Sufficient and Sufficient (N = 137) | χ² | p | LR | | |
|---|---|---|---|---|---|---|---|---|
| | | | | | | β | SE | p |
| Depression (N / %) | Minimal | 71 / %34.3 | 40 / %29.2 | (3, N=344) =8.360 | **0.039*** | 0.164 | 0.419 | **0.040*** |
| | Mild | 45 / %21.7 | 49 / %35.8 | | | 0.633 | 0.287 | **0.028*** |
| | Moderate | 69 / %33.3 | 35 / %25.5 | | | -0.188 | 0.312 | 0.548 |
| | Severe | 22 / %10.6 | 13 / %9.5 | | | -0.024 | 0.451 | 0.958 |
| Anxiety (N / %) | Low | 156 / %75.4 | 102 / %74.5 | (2, N=344) =0.386 | 0.611 | -0.311 | 0.469 | 0.574 |
| | Moderate | 18 / %8.7 | 16 / %11.7 | | | 0.406 | 0.385 | 0.292 |
| | High | 33 / %15.9 | 19 / %13.9 | | | 0.095 | 0.368 | 0.798 |
| Gender (N / %) | Female | 179 / %63.7 | 102 / %36.3 | (1, N=344) =8.601 | **0.005*** | 0.832 | 0.288 | **0.004*** |
| | Male | 28 / %44.4 | 35 / %55.6 | | | | | |

*: $p<0.05$, PAL: Physical Activity Level, p: Statistical Significance Level; χ²: Chi-square analysis test value; LR: Logistic Regression; SE: Standart Error

When the relationship between the anxiety level and PAL of the participants was examined, the number of participants with insufficient PA at all anxiety levels was higher than those with sufficient levels of PA, but this difference was not statistically significant ($p> 0.05$) (Table 3).

When the relationship between the participants' gender and PAL was examined, it was observed that PAL was insufficient in the majority of female participants and that PAL was low level sufficient or sufficient in the majority of male participants. In addition, as a result of the association test, it was found that there is a moderate effect between gender and PAL (Table 3).

When the relationship between the depression level and anxiety levels of the participants was examined, it was seen that as the depression level increased, the anxiety level also increased, and this difference was found to be statistically significant ($p <0.05$). As a result of the association test, it was found that there is a large effect between depression and anxiety levels (Table 4).

**Table 4.** Relationship between depression and anxiety values of participants

| | | Anxiety Level | | | χ² | p | β | SE | p |
|---|---|---|---|---|---|---|---|---|---|
| | | Low N=258 | Moderate N=34 | High N=52 | | | | LR | |
| Depression Level (N / %) | Minimal | 106/%95.5 | 4/%3.6 | 1/%0.9 | (6, N=344) =97.184 | 0.001* | 0.758 | 0.402 | 0.001* |
| | Mild | 81/%86.2 | 9/%9.6 | 4/%4.3 | | | 1.225 | 0.547 | 0.025* |
| | Moderate | 58/%55.8 | 18/ 17.3 | 28/%29.9 | | | 2.822 | 0.498 | 0.001* |
| | Severe | 13/%37.1 | 3/%8.6 | 19/ 54.3 | | | 3.580 | 0.576 | 0.001* |

*: $p<0.05$, p: Statistical Significance Level; χ²: Chi-square analysis test value; LR: Logistic Regression; SE: Standart Error

As a result of the correlation analysis, it was found that there was no significant relationship of PAL with depression (r = -0.024, p = 0.653), and anxiety (r = -0.008, p = 0.886). Also in the correlation analysis examining the relationship between anxiety and depression, a significant relationship was found (r = 0.493, p = 0.001).

In the partial correlation analysis performed by controlling age and BMI values, it was found that these variables had no statistically significant effect on the relationship between PAL, depression and anxiety.

**Discussion**

The main objective of this study was to investigate the effects of lack of individuals' PA, due to long-term home isolation, on depression and anxiety levels and the relationship between these factors. Participants were reached by creating a survey on the Istanbul Gelisim University online education platform. 327 young adult students were included in the study. The survey included questionnaires determining the PA levels, depression, and anxiety levels of participants.

The results of this study indicate that 60.2% of the students had insufficient PAL, two-thirds of the students were experiencing mild to severe depression (67.7%) and 25% of the students were experiencing moderate to severe anxiety. In addition, it was observed that the frequency of depression was higher in participants with insufficient PAL, and as the depression levels of the participants increased, anxiety levels increased.

As a result of a study done to examine changes in the number of steps worldwide before and after the announcement of COVID-19 as a pandemic, within 10 days after the pandemic announcement, 5.5% decrease in average steps and within 30 days, 27.3% decrease in average steps was detected[26]. In another study evaluating the effects of the COVID-19 quarantine on PA, sedentary behavior, smartphone use and sleep patterns in young adults, it was found that participants spent less time on PA, sat more, spent more time using smartphones, and slept more hours. They stated that behaviors of young adults have changed[27]. In this study, insufficiency of PALs in most of the

young adult individuals is in line with the literature. This decrease in PAL of young adults is due to lifestyle changes during this period.

In addition, PALs tend to decrease with age, and 21.4% of males and 49.5% of females between the ages of 15-24 are not active enough[28]. Similar to the literature, this study found that PALs of females were lower than males.

It has been reported in the literature that PA has antidepressant effects. A recent meta-analysis of 49 prospective cohort studies reported that people with high PALs had a 17% lower likelihood of depression than people with low PALs[29]. Other meta-analyses also stated that low PALs are associated with a greater risk of depression[30,31]. Also, a systematic review found that performing PA during COVID-19 is associated with less anxiety and depression[32]. Similarly, in this study, it was found that the frequency of depression was higher in participants with insufficient PALs. This shows the indirect impact of lifestyle changes resulting from the COVID-19 pandemic on people's psychological states.

In a study conducted in Ireland to estimate the probable prevalence rates of anxiety and depression in individuals during nationwide quarantine due to the COVID-19 pandemic, 27.7% anxiety or depression rate was found in the first week of quarantine[33]. In a systematic review analyzing the current research studies and findings on the prevalence of stress, anxiety and depression in the general population during the COVID-19 pandemic, the prevalence of anxiety was 31.9% and the prevalence of depression was 33.7%[34]. In a study conducted in the U.S. during COVID-19 pandemic stated that adolescents and young adults experienced increased depression and anxiety symptoms[35]. In this study, found a similar prevalence of anxiety and a high rate of depression. In line with the literature and results, it can be said that COVID-19 not only causes physical health problems but also causes a series of psychological disorders.

Among the limitations of this study, the low number of individuals reached due to the pandemic process can be shown. Different measurement methods could also be used to determine and classify the PA, anxiety, and depression levels of the participants. Although the participants were informed about the points to be careful about while filling out the questionnaires, this may not be enough for some participants. In addition, sample was based on only one university, and there was an unequal gender distribution, which can limit the generalizability of the results.

**Conclusion**

In conclusion, it was determined that PALs of individuals decreased significantly due to the COVID-19 pandemic. It was found that this decrease was significantly associated with the increase in individuals' depression levels. It was observed that as PAL decreased, the level of anxiety increased, but this relationship was not statistically significant. In addition, it was found that the increase in depression level and the increase in anxiety level were related. Based on the data obtained, it was found that during COVID-19 pandemic process, lifestyle changes occurred in

individuals, a more sedentary life was started in young adults, and this situation has negative effects on psychological factors. Necessary precautions should be taken to prevent this sedentary lifestyle from becoming permanent and causing future psychological diseases.

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