FOOD and HEALTH

FOOD and HEALTH
E-ISSN 2602-2834

Food Health 8(2), 118-126 (2022) • https://doi.org/10.3153/FH22012 Research Article

# COVID-19 phobia, mindful eating, eating habits and body weight change among university students during pandemic: A pilot study

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**Cite this article as:**
Ayyıldız, F., Karaçil Ermumucu, M.S. (2022). COVID-10 phobia, mindful eating, eating habits and body weight change among university students during pandemic: A pilot study. *Food and Health,* 8(2), 118-126. https://doi.org/10.3153/FH22012

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**Submitted:** 05.06.2021
**Revision requested:** 02.11.2021
**Last revision received:** 02.10.2021
**Accepted:** 23.11.2021
**Published online:** 16.03.2022

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Available online at
http://jfhs.scientificwebjournals.com

## ABSTRACT

To evaluate the effects of the COVID-19 phobia on mindful eating, eating habits and body weight change among university students. This study was carried out with 385 university students who have been in social isolation at home for at least 2 months. The online survey was constituted via an internet-based questionnaire on Google forms. The survey includes demographics features, body weight, eating habits, change in appetite and consumption of food/food groups. COVID-19 Phobia Scale (C19P-S) and the Mindful Eating Questionnaire (MEQ) were used. Results: Both males and females had similar scores from C19P-S and MEQ. Body weight and BMI of students significantly increased during the pandemic period ($p<0.05$). The percentage of being underweight decreased and being pre-obese/obese increased during the pandemic period. The percentage of the increase in the consumption of sweets, toffees, candies and foods with sugar was high in both groups (male: 48.2%; female: 47.1%). The most increased consumption of food groups was fruit, and also fast food was the most decreased among the consumption of food groups in this study. In addition, a negative correlation was found between C19P-S and MEQ scores ($r=-0.214$, $p<0.001$). And also there was a negative correlation between the MEQ subscale of emotional eating scores and psychological, psycho-somatic and social subscales of C19P-S ($p<0.01$). C19P-S scores had significantly higher in those with increased or decreased appetite and MEQ scores had significantly higher in those who have decreased or unchanged appetite. COVID-19 phobia can affect mindful eating and eating habits during the social isolation/pandemic period in university students. It is important to increase mindful eating during the pandemic, to provide adequate and balanced nutrition, to reduce the risk of disease and to affect the course of the disease positively.

**Keywords:** COVID-19 phobia, Mindful eating, Eating habits, Body weight change

## Introduction

Severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) (generally known as COVID-19) emerged in Wuhan, China in December 2019 and spread throughout the world. The World Health Organization (WHO) declared COVID-19 as a pandemic on 11 March 2020 (WHO, 2021a; WHO 2020). COVID 19 is a fatal and highly infectious disease, which has several symptoms such as fever, cough, shortness of breath, muscle ache, sore throat, chest pain, diarrhea, nausea and vomiting (Chen et al., 2020). Deaths from COVID 19 are still increasing, and the disease is not yet controlled around the world (Arpaci et al., 2020). After the rapid spread of COVID-19, many measures were taken to protect people's health all over the world. In Türkiye, many preventive precautions such as the closure of schools, shopping centers, entertainment venues, sports halls, curfew and travel restrictions have been taken (Karslıoğlu et al.,2020) University students started to join online education and quarantined at home in March 2020 (Karslıoğlu et al., 2020; Türk Tabipler Birliği, 2020)

This new disease caused fear and anxiety. Because of COVID-19, due to fatal disease, people can worry, fear and panic about not only their own health, but also the health of their families and the people around them (CDC, 2021). It was reported that all of these social restrictions caused fear, stress, panic, anxiety and depression in students, too (Peters et al., 2020). Especially the pandemic period, in which social isolation was aimed, affected the lives of individuals negatively. Individuals in pandemic period have been shown to have a high frequency of psychological diseases (depression, stress, insomnia etc) (Brooks et al., 2020; Ahorsu et al., 2020).

Staying at home constantly can also affect people's eating habits. People, who are social creatures, may change their eating habits due to increased fear and anxiety caused by the social isolation (Abbas and Kamel, 2020). As it is known, psychological states (such as anxiety, fear, stress, sadness) of individuals can negatively affect their eating behaviors (Framson et al., 2009). When people are stressed, they often change their calorie intakes by either increasing or decreasing (Dallman, 2010). Emotional status like stress is related with higher energy, fat, carbohydrate, and protein intakes (Moynihan, 2010). Qurantine period can induce stress, and this stress might cause overeating and higher consumption of carbohydrate rich foods which have positive effect on mood (Muscogiuri et al., 2020).

Therefore, more attention should be paid to a healthy diet and ideal body weight during this period (Muscogiuri et al., 2020). It has been reported that healthier food choices can be made by increasing the attention to eating behavior and reducing the sensitivity to thoughts and feelings during food consumption (Omiwole et al., 2019; Baer et al., 2005). Mindfulness is associated with many positive health outcomes, including decreasing anxiety and preventing eating disorders (Allen et al., 2006). Mindful eating has been described as noticing how and why eating behavior occurs rather than what is eaten (Köse et al., 2016). Mindful eating may not only reduce food cravings (Alberts et al., 2012) but also be effective in body weight control (Framson et al., 2009; Forman et al., 2009) .

To our knowledge, this study is the first study, which examined the association of COVID-19 phobia with mindful eating in our country. We hypothesized that-COVID-19 Phobia increases mindful eating and affects eating habits negatively during pandemic period. Therefore, in this study, it was aimed to evaluate the effects of COVID-19 phobia, mindful eating, eating habits and body weight change in university students, an important risk age group, who underwent social isolation to protect themselves against the epidemic.

## Materials and Methods

### *Materials*

This cross-sectional study was carried out between March and July 2020 in the city center of Ankara and Antalya, Türkiye. In this study, 329 females and 56 males; totally 385 university students were participated. The mean age of the male and female was 21.8 ±2.09 and 20.9 ±1.74 years, respectively ($p<0.05$). Students who have been in social isolation at home for at least 2 months due to the COVID-19 outbreak were included in the study. Despite contacted with approximately 1200 students, 32.0 % percentage of the students returned.

### *Methods*

The online survey was constituted via an internet-based questionnaire on Google forms. Online approval was obtained from each student to participate in the study. The self-report survey includes demographics features (e.g., age, gender, education, and status), body weight, height, eating habits, change in appetite and consumption of food/food groups. It was questioned whether the body weight and eating habits of the participants changed before the pandemic and during pandemic period. A questionnaire including the change in appetite of the individuals and the consumption of food groups was prepared. COVID-19 Phobia Scale (C19P-S) and the Mindful Eating Questionnaire (MEQ) were used for the assesment of COVID-19 phobia and mindful eating habits re-

spectively. The body mass index (BMI) was calculated by dividing body weight (kg) by height ($m^2$). After this calculation, BMI was classified as four groups. (1: Underweight (<18.5 $kg/m^2$), 2: Normal (18.5–24.9 $kg/m^2$), 3: Pre-obesity (25.0–29.9 $kg/m^2$), 4: Obese (≥30.0 $kg/m^2$) (WHO, 2021b)

### *COVID-19 Phobia Scale (C19P-S)*

COVID-19 Phobia Scale (C19P-S) was developed, Turkish validity and reliability of the scale in was made by Arpacı et al. (Cronbach alpha: 0.925) (Arpacı et al., 2020). This scale includes 20 items. The scale consists of 4 sub-factors: psychological, psycho-somatic, economic and social. A five-point Likert-type scale (from 1"strongly disagree" to 5 "strongly agree") was used to evaluate the levels of COVID-19 phobia. The total score of scale ranges from 20 to 100. A higher total score indicates a greater phobia level.

### *Mindful Eating Questionnaire (MEQ)*

Mindful Eating Questionnaire (MEQ) was developed by Framson et al (Framson et al., 2009) and adapted into Turkish by Köse et al. (Cronbach alpha: 0.733) (Köse et al., 2016). This scale includes 7 subscales: disinhibition, emotional eating, eating control, mindfulness, eating discipline, conscious nutrition and interference. A five-point Likert-type scale (1: never, 2: rarely, 3: sometimes, 4: often, 5: usually) was used to assess the mindful eating level. In this scale, 10 items (1, 7, 9, 11, 13, 15, 18, 24, 25 and 27) are scored straight; other 20 items are scored reserve. Higher scores indicate more mindful eating level.

### *Statistical Analysis*

The data obtained were imported into Microsoft Excel, and The Statistical Package for the Social Sciences (version 24.0) software was used for all the analyses. The evaluation of the demographic characteristics, dietary patterns and obesity of students was based on numbers and percentages. The *t*-test (paired samples) was used to evaluate body weight before and during pandemic period. The means and SDs of each subscale and total scores of COVID-19 Phobia Scale and Mindful Eating Questionnaire of participants according to BMI classification during pandemic period were measured. The One-Way Anova was used for COVID-19 phobia and mindful eating of participants according to BMI classification during pandemic period. The Spearman test was used to evalulate the relationship between COVID-19 phobia and mindful eating of students. Results were considered statistically significant at p-values <0.05 for all analyses.

## Results and Discussion

Public health emergencies can have many psychological effects on individuals, which can be expressed as anxiety, fear, and worry (Mei et al., 2011; Gritsenko et al.,2020; Ornell et al., 2020) and to understand the psychological effects of a pandemic, the emotions such as fear and anger, must be considered and observed (Arpaci et al., 2020; Cao et al.,2020; Butler and Barrientos, 2020; Ammar et al., 2020). Social isolation is a very important public health emergency objective to protect against the COVID-19 (Muscogiuri et al, 2020). Being forced to stay indoors due to the COVID-19 pandemic for a long time can eventually lead to anxiety and stress conditions that can cause change in mindfulness, eating habits,body weight change of healthy individuals(Abbas and Kamel, 2020; Framson et al., 2009; Dallman, 2010; Moynihan et al., 2010; Muscogiuri et al, 2020). The evaluation of body weight of individuals before and during the pandemic period was given in Table 1. Before pandemic, 12.7% of the participants are underweight, 70.9% are normal and 16.4% are overweight according to BMI classification. In present study, the mean body weight (kg) was 60.6±11.56 before the pandemic but was 61.4 ±12.13 during the pandemic ($p<0.001$). Also the mean BMI of students significantly increased during the pandemic period (22.2 ±3.43 $kg/m^2$) compared to before the pandemic period (21.9 ±3.28 $kg/m^2$) (Table 1). Similar to our study, it was found that COVID-19 pandemic was greatly associated with increased weight gain (Pellegrini et al., 2020; Reyes-Olavarría et al., 2020). Higher BMI is now also thought to be a risk factor for COVID-19 mortality (Klang et al., 2020). That's why we can say that pandemic period can lead to COVID-19 phobia conditions that can cause increased weight gain and change eating habits of healthy students in this study.

Ammar et al. (Ammar et al., 2020) stated that that anxiety, boredom or COVID-19 phobia could cause negative changes in eating behavior. In a study, 82 % of participants reported an increase in the amount of unhealthy food during pandemic (Robinson et al., 2021). Further, constantly hearing or reading about the epidemic without a break during quarantine can be stressful. Only 18.4 % of students stated their appetite decreased but near the half of students (42.9 %) reported that their appetite increased during pandemic period (data not shown in table) in present study. Consequently, the stress pushes people toward overeating, mostly looking for sugary foods (Muscogiuri et al., 2020). Changes in consumption of food groups and certain foods in participants during the pandemic period were shown in Table 2. Similarly, the percentage of the increase in the consumption of sweets, toffees, candies and foods with sugar was high in both groups (male: 48.2 %; female: 47.1 %) in this study (Table 2). During this pandemic period, it is important to take care of nutritional habits, following a healthy and balanced nutritional pattern containing a high amount of minerals, antioxidants, and vitamins. It

was reported that fruit and vegetables supplying micronutrients can boost immune function (Abbas and Kamel, 2020; Muscogiuri et al., 2020; Butler and Barrientos, 2020) It was found that the most increased consumption of food groups was fruit, and also fast food was the most decreased among the consumption of food groups in this study (Table 2). This may be due to the social isolation and lack of access to fast food because of the COVID phobia in this age group.

Stress and emotional status influence eating behavior. To many, stress and negative mood can induce loss of appetite and hypophagia (Macht,2008). However negative emotions and stress cause them to eat more and increase emotional eating (Van Strien,2018) So mindful eating is important to reduce food cravings (Alberts et al., 2012) and is associated with preventing eating disorders and obesity (Allen et al., 2006; Alberts et al., 2012). Mindful eating has been described as noticing how and why eating behavior occurs rather than what is eaten (Köse et al., 2016), and it is also effective in body weight control (Framson et al., 2009; Alberts et al., 2012) Similarly, in present study those who stated that his/her appetite was decreased or not changed had the significantly higher score from MEQ than increased appetite (p: 0.021). Evaluation of COVID-19 phobia and mindful eating of participants according to obesity during the pandemic period was shown in Table 3. Furthermore, total MEQ scores were the highest in underweight ($p<0.001$) (Table 3). Total and subscales scores of C19P-S (except social subscale) had not significantly difference according to the BMI classification ($p>0.05$). Spearman correlation matrix of the relationship between ages, body weight, BMI, total C19P-S with MEQ scores were given Table 4. Total C19P-S scores was negatively associated with total MEQ scores (r:-0.203 $p<0.001$). There was a significant negative correlation between total MEQ scores and body weight/BMI during pandemic ($p<0.001$). There was a significant positive correlation between total MEQ scores and age ($p<0.001$). The percentage of being underweight decreased, but being pre-obesity/obese increased during the pandemic period (Table 1).Therefore, mindful eating is important not only for the prevention of obesity, but also for the adequate and balanced nutrition (Butler and Barrientos,2020; Van Strien,2018) . Total C19P-S scores was negatively associated with total MEQ scores (r:-0.203 $p<0.001$) in this study (Table 4). In addition, Total C19P-S score was related negatively MEQ subscales (disinhibition, emotional eating, eating control and interference). Spearman correlation matrix of the relationships between C19P-S and MEQ subscales were given Table 5. Total C19P-S score was related negatively disinhibition, emotional eating, eating control and interference subscale scores of MEQ. Total MEQ score was related negatively C19P-S subscales (psychosomatic, social and economic) ($p<0.01$). (Table 5). Increased COVID-19 phobia might cause decreasing mindfulness.

**Table 1.** Evaluation of body weight in individuals before and during the pandemic period

| | Total (n:385) | | |
|---|---|---|---|
| | Before pandemic period | During pandemic period | |
| **Variables** | **X ±SD** | **X ±SD** | **p** |
| Body weight (kg) | 60.6±11.56 | 61.4±12.13 | **<0.001** |
| BMI (kg/m$^2$) | 21.9±3.28 | 22.2±3.43 | **<0.001** |
| **Obesity classification** | **n (%)** | **n (%)** | |
| Underweight | 49 (12.7) | 39 (10.1) | |
| Normal | 273 (70.9) | 268 (69.6) | |
| Pre-obesity /Obese | 63 (16.4) | 78 (20.3) | |

BMI: Body mass index

**Table 2.** Changes in consumption of food groups and certain foods in participants during the pandemic period

| | Male (n:56) | | | Female (n:329) | | |
|---|---|---|---|---|---|---|
| | Increased | Decreased | Not changed | Increased | Decreased | Not changed |
| **Food and food groups** | **n (%)** | **n (%)** | **n (%)** | **n (%)** | **n (%)** | **n (%)** |
| Bread and types of bread | 26 (46.4) | 7 (12.5) | 23 (41.1) | 126 (38.3) | 65 (19.8) | 38 (41.9) |
| Rice/bulgur/ pasta | 28 (50.0) | 14 (25.0) | 14 (25.0) | 133 (40.4) | 55 (16.7) | 141 (42.9) |
| Milk and milk products | 28 (50.0) | 5 (11.4) | 23(41.1) | 168 (51.1) | 39 (11.9) | 122 (37.1) |
| Meat and meat products | 33 (58.9) | 6 (10.7) | 17 (30.4) | 168 (51.1) | 40 (12.2) | 121 (36.8) |
| Legumes | 24 (42.9) | 10 (17.9) | 22 (39.3) | 102 (31.0) | 48 (14.6) | 179 (54.4) |
| Vegetables | 31 (55.4) | 9 (16.1) | 16 (28.6) | 182 (55.3) | 28 (8.5) | 119 (36.2) |
| Fruits | 33 (58.9) | 6 (10.7) | 17 (30.4) | 209 (63.5) | 35 (10.6) | 85 (25.8) |
| Sweets, toffees, candies and foods with sugar | 27 (48.2) | 7 (12.5) | 22(39.3) | 155 (47.1) | 70 (21.3) | 104 (31.6) |
| Fast foods | 10 (17.9) | 39 (69.6) | 7 (12.5) | 32 (9.7) | 244 (74.2) | 53 (16.1) |

**Table 3.** Evaluation of phobia of COVID-19 and mindful eating of participants according to BMI classification during pandemic period

| | Underweight (n:39) | Normal (n:268) | Pre-obesity/Obese (n:78) | p |
|---|---|---|---|---|
| **MEQ Subscales** | **X ±SD** | **X ±SD** | **X ±SD** | |
| Disinhibition | 18,8 ±2.67[a] | 16.6 ±3.77[b] | 15.8 ±3.29[b] | **<0.001** |
| Emotional Eating | 18.0 ±3.68[a] | 16.2 ±4.31[a.b] | 15.2 ±4.75[b] | **<0.001** |
| Eating Control | 16.4 ±3.71[a] | 14.3 ±3.73[b] | 14.2 ±3.60[b] | **<0.001** |
| Mindfulness | 14.8 ±1.85[a] | 15.9 ±1.96[b] | 15.7 ±1.87[b] | **<0.001** |
| Eating Discipline | 12.6 ±2.52 | 13.0 ±2.69 | 13.2 ±2.36 | 0.488 |
| Conscious Nutrition | 15.8 ±2.13 | 15.7 ±2.66 | 15.3 ±2.81 | 0.523 |
| Interference | 7.4 ±1.58 | 6.9 ±1.77 | 7.2 ±1.39 | 0.153 |
| **Total MEQ scores** | 100.7 ±11.66[a] | 95.0 ±13.47[b] | 92.9 ±13.67[b] | **<0.001** |
| **C19P-S Subscales** | **X ±SD** | **X ±SD** | **X ±SD** | **p** |
| Psychological | 18.8 ±4.62 | 19.2 ±4.77 | 19.3 ±4.04 | 0.884 |
| Psycho-Somatic | 8.4 ±3.11 | 9.1 ±3.21 | 9.2 ±2.98 | 0.337 |
| Social | 12.0 ±3.12[a] | 13.3 ±3.66[a.b] | 13.9 ±3.42[b] | **<0.001** |
| Economic | 7.4 ±2.34 | 7.9 ±2.57 | 8.5 ±2.37 | 0.067 |
| **Total C19P-S scores** | 46.8 ±10.40 | 50.1 ±11.22 | 51.9 ±9.42 | 0.550 |

MEQ: Mindful Eating Questionnaire, C19P-S: COVID-19 Phobia Scale

Furthermore, pandemic period may lead to emotional disturbance and may be a risk factor for the development of COVID-19 phobia in university students. Students are generally sociable beings, and this period of social isolation might have forced them to cope with the growing fear and anxiety (Abbas and Kamel,2020). A survey indicated that college students were afflicted with experienced mild and severe anxiety because of the COVID-19 outbreak (Cao et al.,2020). Another study reported that students were depressed, exhausted, nervous and angry due to COVID-19 (Gritsenko et al.,2020). This study indicated that both males and females had similar scores from C19P-S ($p>0.05$). But there was a significantly difference in perceived appetite. Those who stated that his/her appetite was increased or decreased had the significantly higher score from C19P-S than unchanging appetite ($p<0.001$). It can be said that there is a relationship between appetite change and COVID-19 phobia. COVID-19 phobia may have influence on weight-related behaviors such as appetite change among university students.Providing reduced covid phobia can increase mindful eating in students and may have positive effects on body weight change.

**Table 4.** Spearman correlation matrix of the relationship among age, body weight, BMI, total C19P-S and MEQ scores

| | 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|---|
| **1.Age (years)** | 1 | | | | |
| **2.Body weight during pandemic (kg)** | 0.202* | 1 | | | |
| **3.BMI during pandemic (kg/m$^2$)** | 0.182* | 0.861* | 1 | | |
| **4.Total C19P-S scores** | 0.074 | 0.016 | 0.050 | 1 | |
| **5.Total MEQ scores** | 0.191* | -0.202* | -0.198* | -0.203* | 1 |

*p<0.001, MEQ: Mindful Eating Questionnaire, C19P-S: COVID-19 Phobia Scale

**Table 5.** Spearman correlation matrix of the relationships between C19P-S and MEQ subscales

| **C19P-S and MEQ Subscales** | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1.Psychological | 1 | | | | | | | | | | | | |
| 2.Psycho-Somatic | 0.457** | 1 | | | | | | | | | | | |
| 3.Social | 0.690** | 0.562** | 1 | | | | | | | | | | |
| 4.Economic | 0.345** | 0.543** | 0.446** | 1 | | | | | | | | | |
| **5.Total C19P-S scores** | 0.795** | 0.771** | 0.858** | 0.669** | 1 | | | | | | | | |
| 6.Disinhibition | -0.074 | -0.145** | -0.200** | -0.150 | -0.192** | 1 | | | | | | | |
| 7.Emotional Eating | -0.147** | -0.113* | -0.247** | -0.096 | -0.221** | 0.618** | 1 | | | | | | |
| 8.Eating Control | 0.015 | -0.081 | -0.134** | -0.104* | -0.108* | 0.487** | 0.345** | 1 | | | | | |
| 9.Mindfulness | -0.066 | -0.094 | -0.061 | 0.030 | -0.079 | 0.041 | 0.096 | 0.139** | 1 | | | | |
| 10.Eating Discipline | 0.002 | -0.081 | -0.072 | -0.018 | -0.067 | 0.269** | 0.279** | 0.341** | 0.293** | 1 | | | |
| 11.Conscious Nutrition | -0.024 | -0.017 | -0.096 | -0.080 | -0.091 | 0.400** | 0.269** | 0.398** | 0.092 | 0.296** | 1 | | |
| 12.Interference | -0.105* | -0.145** | -0.186** | -0.121* | -0.173** | 0.469** | 0.461** | 0.347** | 0.116* | 0.411** | 0.338** | 1 | |
| **13.Total MEQ scores** | -0.085 | -0.144** | -0.228** | -0.138** | -0.214** | 0.788** | 0.753** | 0.713** | 0.228** | 0.563** | 0.592** | 0.627** | 1 |

*p<0.05, ** p<0.01, MEQ: Mindful Eating Questionnaire, C19P-S: COVID-19 Phobia Scale

The best recommendation for staying healthy during pandemic is to follow the general health advice such as eating a balanced diet with mindful eating and managing stress (Muscogiuri et al., 2020). Patients with anxiety/depression were strongly associated with weight gain and resulted in being the more relevant factor in predicting increase in body weight, after adjusting for consuming unhealthy foods (Pellegrini et al., 2020).

Present study has some limitations. Firstly, despite contacted with approximately 1200 students, 32.0 % percentage of the students returned. This may be due to the online survey forms that are frequently conducted during this period. Secondly, the parameter evaluating the anxiety state of the participants can be added to the study. In our knowledge, there exists no study about COVID-19 phobia and mindful eating. We think this is important in terms of guiding future studies.

## Conclusion

COVID-19 phobia can affect mindful eating and eating habits during the social isolation/pandemic period in university students. COVID-19 phobia, which increases due to the extension of the pandemic, is expected to affect students' mindful eating negatively. It is important to increase the mindful eating during the pandemic, to provide adequate and balanced nutrition, to reduce the risk of disease and to affect the course of the disease positively.

**Compliance with Ethical Standard**

**Conflict of interests:** The author declares that for this article they have no actual, potential or perceived conflict of interests.

**Ethics committee approval:** This study was conducted according to the guidelines laid down in the Declaration of Helsinki, and all procedures involving study participants were approved by the Clinical Research Ethics Committee of Akdeniz University (Project number:KAEK-446). (24/06/2020). The participants consented to participate in the study, with a digital informed consent form.

**Funding disclosure:** -

**Acknowledgments:** Thank you to all participants in our study.

**Disclosure:** -

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