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Moderate Effects of Anxiety and Physical Activities on the Relationship Between Body Image and COVID-19 Fear

Abstract

Improving psychological well-being has been a hot topic in counseling psychology research. However, since the COVID-19 pandemic, people's lifestyle has been changed that caused series mental health problems. Using a sample of 576 participants from different universities. This study examined whether Covid-19 correlated with Body image a) whether anxiety moderated this relationship. b) whether physical activities moderated this relationship. c) how does different kind of body image avoidance being influenced. Pearson's correlation test and linear regression analyses were conducted. The result indicated that COVID-19 fear has significantly positive relationship with body image. physical activities level has significantly increase the relationship between COVID-19 fear and body image avoidance-food restriction, body image avoidance-behavior, and body image avoidance-body image concerns. Anxiety has significantly positive moderate effects on the relationship between body image-food restriction and COVID-19 fear. The implication of present findings for college education, clinical psychoeducation was discussed based on the results.

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In Partial Fulfillment

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by

Yutong Guo

June 2021

Advisor: Dr. Ruth Chu-Lien Chao

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ABSTRACT

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CHAPTER 1. INTRODUCTION

Novel Coronavirus is regarded as the virus with the highest pathogenic rate in human history (SÜMEN, A., ADIBELLI, D., 2020). The pandemic not only influence physical health, but also mental health and well-being (Brooks SK., Webster RK., et al. 2020). According to the previous research, Covid-19 pandemic inducing anxiety in normal population by changed lifestyle, fear of contamination, concerns about getting necessary food, and trauma related experiences.

During the Covid-19 period, government published stay at home and university conducted online class make students spend a lot of time at home. The changed lifestyle causes increased food intake and reduced activities, and then, influence weight perception. The weight perceptions are influenced by real weight, cognition, and emotions (Haynes, A., Kersbergen, I., et al. 2018). A research suggested that other factors may also play a role, such like the anxiety, isolation, confusion always initiate negative self-image. (McGinty, E. E., Presskreischer, R., et al. 2020).

According to sociocultural models, body image dissatisfaction may come from the perceived stress from surroundings, such as family members, friends and media. The individual may internalize social portrayed perfect body image as their ideal body appearance, their central self-worth and goal (Fitzsimmons-Craft et al., 2012 ,

Stice, 2001). However, such ideal body image also induce the comparisons with others and also, body surveillance (perceived failure to meet ideal body look or admired body appearance; Fitzsimmons-Craft et al., 2012). Thus, body surveillance increase body dissatisfaction accompanying with negative emotions, feelings, depressive symptoms, poor self-esteem and also, anxiety (Stice, 2001).

The reduced physical activities was another factor that contribute to body image concerns. In combination with un-planned eating behaviors, and pandemic related anxiety will increase the risk of ED (Lombardo, C., Ballesio, A., Gasparrini, G., & Cerolini, S. 2020). Physical activities may provide negative influence on self-perceived body image among people with eating disorder. It comes from the social isolation, fear of get contaminated by virus and change of lifestyle. However, previous research mainly focused on ED patients, the research conducted on normal population has not been found yet. Furthermore, during COVID-19 period, many other factors many triggered different anxiety, causing anxiety induced negative body image. By providing broader understanding of anxiety and limited physical activities function, mental health clinician could work on providing comprehensive treatment plan for people with these concerns to improve life quality.

In this research, we mainly tested moderate effect of anxiety and physical activities on body image during Covid-19 pandemic. Anxiety has been tested by the Generalized Anxiety scale, body image was tested by Body image questionnaire, and physical activity behavior was monitored by Physical activity level scale. In addition to these scales, we also used COVID fear scale to test the COVID impact on personal life.

Hypothesis 1: There is a positive relationship between body image and COVID-19 fear.

Hypothesis 2: Anxiety moderates the relationship between COVID fear and body image.

Hypothesis 3: Physical activity moderates the relationship between COVID fear and body image.

CHAPTER 2. LITERATURE REVIEW

2.1 Covid-19 Fears

Novel Coronavirus is regarded as the virus with the highest pathogenic rate in human history (Sumen, A., Adibelli, D. 2020). On 11 March 2020, WHO Director-General Tedros Adhanom announced that, based on assessments, WHO believes the current COVID-19 outbreak can be described as a global pandemic. The clinical manifestation of Novel Coronavirus infected pneumonia patients is different. Fever, fatigue and cough are the main manifestations. Upper respiratory tract symptoms such as nasal congestion and runny nose are rare, resulting in hypoxia. About half of the patients developed dyspnea after one week, and in severe cases, the rapid progression was acute respiratory distress syndrome, septic shock, metabolic acidosis that was difficult to correct, and coagulation dysfunction. Some patients may have moderate to low fever or even no obvious fever in the course of disease. Some patients have mild onset symptoms, but no fever, recovery in more than 1 week. Most patients have a good prognosis, and a few patients are in critical condition or even die.

The transmission routes of COVID-19 are mainly direct transmission, aerosol transmission and contact transmission. Direct transmission refers to the infection caused by droplets of sneezing, coughing, talking. Aerosol transmission refers to droplets mixed in the air, forming aerosols, after inhalation of infection; contact transmission refers to

the deposition of droplets on the surface of objects, contact with contaminated hands, and then contact with mucous membranes such as mouth, nose and eyes, leading to infection. Due to its highest pathogenic rate, the government has promulgated policies to reduce the transmission rate of the Novel coronavirus.

The pandemic not only influence physical health, but also mental health and well-being (Brooks SK., Webster RK., et at. 2020). People have had serious fearful mood due to situations such as fear of getting COVID-19, worrying about their health situations after recovering from the disease, and worrying about infecting others, all of these negative thoughts and mood that related to COVID-19 has been giving a concept of the fear of COVID-19. Schimmenti, Billieux and Starcevic (2020) identified four areas of fear:(1) fear of the body, (2) fear of significant others, (3) fear of the unknown, and (4) fear of inaction. This theory tested COVID-19 fear based on bodily, interpersonal, cognitive and behavior. In this research, we tested COVID-19 fear based on this theory since it is included four types of fear, we are interested in combine these domains to body image avoidance behavior during pandemic, to see if COVID-19 fear will influence the body image and how does it influence. To test fear, there is a 7-item self-report, unidimensional scale.

A research found that COVID-19 fear could mediate the relationship between psychological resilience and life satisfaction (Gundogan, S., 2021). COVID-19 fear may also induce trauma-related experience of SARS because they share several same symptoms. Because of fear, people use pandemic-related containment measures, such as quarantine, social distancing, and wearing masks, frequently using disinfection product to

prevent the spread of virus, however, these behaviors somehow threaten mental health. (Shigemura J., Ursano R.J., et al. 2020).

In particular, quarantine and social distance order could increase loneliness and reduced social interactions, which are well known risk factors for several mental disorders, including schizophrenia and major depression (Fiorillo A., Gorwood P., 2020), if the concerns about the pandemic are prolonged, they may increase the risk of disorders in adult males and females, including panic, obsessive compulsive, stress, and trauma-related disorders (Feichit T., Wittmann M., et al, 2013).

2.2 Body image

Body image refers to an individual's image of his own body, and it is an individual's objective cognition and subjective evaluation of his own body characteristics. It is composed of appearance body shape, physical strength, health and other dimensions. The degree of self-awareness can affect emotional and health behaviors, such as weight control, individual social adaptation, psychological stress, self-development, interpersonal relationship (Ouyang, Y., Wang, K., et al. 2020).

Internalized weight bias (IWB), the belief that negative weight stereotypes apply to the self, is an important concern for women as it is associated with a range of physical and psychological problems, including eating disorders (Durso et al., 2012, 2016). For example, IWB is associated with binge eating in adults seeking treatment (Carels et al., 2010) and with dietary restraint in college women (Sienko et al., 2016).

Body image avoidance is a candidate that might explain the link between IWB and eating disorders. Body image avoidance is often defined as the avoidance of entering a situation that causes concern about appearance (Rosen et al., 1991). Examples of avoiding body image include avoiding reflective surfaces (such as mirrors), weighing yourself, wearing well-fitting clothes, and taking photos. Body image avoidance is an important behavioral manifestation of body image interference, including cognitive, affective and behavioral expressions of body dissatisfaction (Pellizzer et al. 2017). Multiple studies have found a positive correlation between body image avoidance, eating disorders, and negative attitudes toward weight and body shape (Durso., Latner. 2008; Purton et al. 2019).

With the development of society, nowadays people have higher and higher requirements on their bodies. As a result, many people are not satisfied with their bodies, which is especially evident in the female group (Rosen., Gross. 1987). For weight, the dissatisfaction of body shape not only exists on the physical level, but also on the psychological level. Studies have suggested that such dissatisfaction and negative attitudes toward a distorted self-image are necessary criteria for diagnosing an eating disorder. In fact, there is fairly consistent evidence that body image disorders predict relapse after eating disorder treatment (Rosen. 1990). With the advent of the pandemic, the changed lifestyle and its psychological influences makes it even more important to study body image. A positive body image can enhance the self-esteem of college student and form a stable sense of self-esteem (Ouyang, Y., Wang, K., et al. 2020).

Self-esteem has a positive or negative attitude toward itself. It is holistic and concrete. A person can evaluate many of his or her characteristics or put them together to form an overall evaluation. Therefore, self-esteem is a kind of emotional evaluation of individuals, and is an important factor to predict the implementation of healthy behaviors (Hülya, A., Macide, T., and Koca, C. 2006). Self-esteem may also be influenced by social values, concerns, and evaluations. In addition, college student's excessive attention to body shape and the society's excessive publicity to the ideal body shape lead to people's unbalanced expectation of their own body, resulting in negative emotions and low self-esteem (Beatrix, K., Macide, T., and Koca, C. 2006)

Body image can be an important aspect of self-esteem, especially in cultures that emphasize thinness as the "ideal" image. A lot of studies have tested the relationship between body image and self-esteem. Some research found significant correlations between self-esteem and body image dissatisfaction (Foster, G.D., Wadden, T.A., et al. 1997). However, other research also reported that there were not significant correlation between body image and self-esteem (Grilo, C.M., Wifley, D.E., et al. 1994). The inconsistent results may result from the difference in culture, age, subject size, and population. There was also a speculation that body dissatisfaction may only influence the people who value appearance as an essential part of self-evaluation. Thus, if self-esteem is come from physical appearance, others may influence the results (Edwards, C. 1999).

A combination of increased food intake and reduced activities may cause increasing weight. Besides the real weight gain, sometimes people feel like they are

gaining weight without the change of real weight, which can be referred as perceived weight gain.

A researcher conducted longitudinal assessments to compare the observed weight changes and the perceived weight change among college students, the result showed that people feel they were eating more, and gaining more weight. At the same time, they did less physical activities, and were spending more time on watching television, gaming comparing with observed data. Furthermore, they were more worried about their weight, eating habit and body shape. The research documents perceived changes since COVID-19 compares these to observed longitudinal changes in BMI, self-reported weight, and the way that students described their weight from Jan 2020 to Apr 2020. The result indicated that self-perceived body weight, eating all increased, and physical activity has been decreased. Participants also reported worries about weight, body shape and eating behavior since pandemic. However, according to measured data, there are no significant change in their actual body weight. Also, the description that participants used to their weight also changed. This research also indicated that the observed changes in reported weight may reflect cognitive distortions that could influence participant's mental health (Keel, P.K., 2020).

2.3 Body Image during COVID-19

The weight perceptions are influenced by real weight, cognition, and emotion. (Haynes, A., Kersbergen, I., et al. 2018). A research suggested that other factors may also play a role, such like the anxiety, isolation, confusion always initiate negative self-image

(McGinty, E. E., Presskreischer, R., et al. 2020). The lack of a significant association between baseline body-image concerns and changes in subjective experience of weight, diet may represent a misperception of stability. These can be the signal of eating pathology (American Psychiatric Association. 2013).

Besides the less physical activities cause negative influence on body image, the closure of beauty industry such as hair salons, make up shop and surgeries conducted for aesthetic purpose may also influence people's confidence and self-perceived body image. Because of the Covid-19, people who use beauty service as their daily coping mechanism may feel increased pandemic-related stress (Tan, E. J., Meyer, D., Neill, E., et al. 2020). Especially for people with dysmorphic concern. This kind of influence mainly occurs in population of body image disorders, people may perceive unnormal weight and size of their body, or over concentrate on any imperfect part on their body (Beilharz, F., Phillipou, A., et al. 2019). They would like to have negative self-perceived body image due to lack of coping mechanisms.

Furthermore, beyond the beauty treatment, people who always obsessed to appearance may also be influenced. A research found enhanced appearance-focused behavior including attractiveness, stick to social norms, reduce body dissatisfaction were commonly among people (Trekels, J., & Eggermont, S. 2017). These behaviors can be found by frequently mirror checking, grooming, camouflaging appearance, applying make-up and appearance comparisons, or seeking reassurance (Phillips, K. A., Menard, W., Fay, C., & Weisberg, R. 2005). During the Covid-19 period, with the Work at home, and Stay at home order, a lot of companies switched to online format for safety reason.

So that people spend more time stay at home and they got more chances to focus on their appearances. A research reported increased frequency of appearance behaviors (Oakes, A., Collison, J., & Milne-Home, J. 2017).

The other author mentioned that with decreased COVID-19 restrictions, the appearance-focused behavior maybe decreased either. Body image concern also showed among individuals with eating disorders. A research found increased engagement in diet, workout, binge eating or purging eating behavior among eating disorder population slightly before the pandemic (Phillipou, A., Meyer, D., et al. 2020).

However, A research found that for people with low dysmorphic concern, they showed decreased appearance-focused behavior, but for the high dysmorphic group, they reflected unchanged physical appearance-focused behavior. These people mainly were those who live alone, younger age, have more interaction related to the closure of beauty service because of COVID-19 (Pikoos, T. D., Buzwell, S., et al. 2020). Except this, this research also reflected that appearance-focused behavior are not only driven by public scrutiny, but also other reasons like stress, changed life routine, or self-control (Oates, J., & Sharp, G. 2017). People may face financial problem, or difficulty in using unfamiliar application online. Their body-image may connect with stress manage and anxiety relief, which were influenced by COVID-19. For those with lower appearance concern, they may see quarantine as a good break and feel less social pressure (Radix, A. K., Rinck, M., Becker, E. S., & Legenbauer, T. 2019).

Hypothesis 1: There is positive relationship between body image and COVID-19 fear.

2.4 Body image and eating disorder during COVID-19

During the pandemic, there are three changes in our daily life. The first thing is the change of daily routine, decreased activities and limited access to outdoor events would increase anxiety among people with body image concerns, especially among people with eating disorder. A research found out that pandemic increased risks of exacerbated eating disorder and rise up body image concerns in several ways. First, with the application of stay-at-home order, people started work and study at home which reduced the chances to go outside (Rodgers, R. F., Lombardo, C., et al. 2020). Except this, their daily routine may be interrupted because of confusion of boundary. many students mentioned that they could not focus on online classes as well as in-person classes causing decreased effectiveness. Part of their attention has been split by eating. The interrupted daily routines caused un-planned mealtimes and increased snacking and grazing, and in case, increasing body image concerns, increasing avoidance behaviors. (Heriseanu, A. I., Hay, P., Corbit, L., & Touyz, S. 2017). Furthermore, with the fear of get contagious virus may increase stock behavior, people tend to buy foods more than usual, including snacks, these behaviors could induce the binge eating behaviors (Waters, A., Hill, A., & Waller, G. 2001).

The reduced physical activities may also increase the risk of body image concerns. In combination with un-planned eating behaviors, and pandemic related anxiety will increase the risk of ED (Lombardo, C., Balleisio, A., Gasparini, G., & Cerolini, S. 2020). Social factor also influenced eating habit and rise up anxiety and body-related concerns. Social Support was known as a protective and resilience factor for mental health. With

sufficient social support provided, people get more control over their own behaviors including disordered eating. (Leonidas, C., & Dos Santos, M. A. 2014; Linville, D., Brown, T., et al. 2012). However, because of the stay-at home order, and suggested 6 feet social distance among people may constitute a barrier to good social support. In this case, people may easily be influenced by the environment and have trouble with emotional regulation (Cook-Cottone, C. 2016). Furthermore, these restrictions may increase the need of health care. Due to the pandemic, many institutions switched their work online to avoid the traditional face to face treatment. This change may discount the effectiveness of treatment (Davis et al. 2020; Fernández-Aranda et al. 2020; Gordon & Katzman. 2020). On the other hand, the resilience of telehealth and difficulties among searching healthcare may negatively influence people with financial concerns. Mulders-Jones, B., Mitchison, D., et al., 2017).

Pandemic has influence on eating related and food -specific anxieties (Davis et al., 2020). As a result, fear of Covid-19 contagion may lead to increased concern about the quality of food or its ability to act as an infectious agent. In turn, this may increase restrictive eating patterns, either due to fear of going out to buy food, or the elimination of certain foods or food groups due to fear of contamination. Studies have shown that disgust response is higher in individuals with ED behavior and is associated with anxiety sensitivity (Anderson et al., 2018).

Patterns of eating disorders characterized by health, rather than weight and body shape, have been investigated in the context of neurotic eating disorders, defined by overly restrictive eating patterns driven by concerns about food quality and health issues

(Dunn & Bratman., 2016). Given the possible increase in health problems associated with the Covid-19 pandemic, and the centrality of information about the usefulness of diet control to promote health in anorexia, it will be important to explore the specific symptomatic aspects of the Covid-19 pandemic that may increase anorexia.

In connection with this, people may adopt restrictive diets that are believed to have immune-related health benefits, protecting them from or minimizing the effects of coronavirus infection (Navaro et al., 2017). Although these types of eating habits have poor characteristics, they can lead to the limitation and elimination of food groups, with significant negative effects on overall functioning, and an increased risk of exposure to the virus due to strict and specific eating habits.

2.5 Media influencing body image during COVID-19

During the initial spring lockdown, people's screen time increased, meaning they were more likely to be exposed to thinness or athletic ideals through the media, and reduced physical activity may deepen negative thoughts about weight or shape. The media effects influence eating related behaviors directly exposed to body-related image and video, the increased times of video using, such as zoom conference and class may influence self-perceived body image.

Media use is always associated with eating disorder, the information related to workout, diet culture content and food advertising may influence people's thoughts. (Boswell & Kober., 2016; Levine & Murnen., 2009; Boswell, R. G., & Kober, H., 2016). During the pandemic, a large amount of news coverage was devoted to the

rising number of infections and deaths, global health and safety issues, and economic and social impacts. As previously found exposure to such news reports also increases the risk of eating disorders (Rodgers et al., 2012).

In addition to pathways related to media consumption, the increased use of videoconferencing technology in the context of "stay at home" commands may also indirectly contribute to the risk of ED behavior through increased focus on appearance. Body image avoidance is a common feature of both body image and eating concerns and posting self-images online has been shown to be detrimental to young women's body image and mood (Mills, Musto, Williams, & Tiggemann., 2018).

2.6 Anxiety

Literature shows that previous epidemics have a high impact on the mental health of individuals and societies (Chong et al., 2004). COVID-19 is no exception. For example, moderate to severe symptoms of depression, anxiety, and stress have been reported in studies of the epidemic in China (Wang et al., 2020).

Anxiety is an emotional reflection caused by a serious deterioration of the value characteristics of real or future things. The opposite form of emotion is expectation, that is, expectation is the emotional reflection of the obvious positive trend of the value characteristics of the present or future things. Anxiety refers to a person's complex and unpleasant emotional state of tension, uneasiness, Anxiety, annoyance and other unpleasant emotions caused by the impending danger or threat.

Anxiety disorder has potential negative influence on physical health, it may increase the risk of cancer, or other deadly disease. (Batelaan et al., 2016; Miloyan et al.,2016; Wang et al.,2019). Previous research has shown that individuals with high levels of health anxiety tend to distort their physical feelings when they live in the context of a virus outbreak, which in turn increases their anxiety and affects their ability to make rational decisions, thus affecting their behavior (Asmundson and Taylor. 2020) Also, due to the closure of school, recreative places, student may face more challenges than usual. Thus, increasing the knowledge of anxiety is necessary. However, cost-effectiveness studies showed that treatment alone is not enough to reduce disease triggered anxiety disorders (Andrews et al., 2004; Neil and Christensen., 2009). There may be a lot of factors worked together to induce anxiety, such as body image-related anxiety due to changed eating habit and workout pattern (Li, Q., Miao, Y., 2020).

The risk is particularly pronounced among college students, most of whom have also experienced a sharp decline in both adult support and parental supervision and support, not surprisingly. A research found that nearly a quarter of college student felt anxious because of COVID-19 outbreak. Gender has no significant effect on coronavirus-related anxiety. However, living with parents and having a stable family income can somehow prevent anxiety (Scharmer, C., Martinez, K., et al., 2020). Even though, the high death rates, and unstable of daily life still contribute to increase mental health concerns, including elevated anxiety (Wang. C., Pan, R., et al., 2020).

There were many researches used ongoing investigations related to the levels of psychological distress comparing with pre-pandemic norms. A research used COVID

Stress Scales to measure five dimensions of COVID-19-specific anxiety (compulsion, stromatic related stress, xenophobia, danger and contamination, and social economic measure.) Another researcher developed Pandemic Anxiety Scale (PAS) which is a brief 7-item measure that is shorter than the previous scale and also tests worries related to disease. Disease anxiety and consequence anxiety were observed in this study (McElroy, E., Patalay, P., et al., 2020).

People who got lower scores on viral outbreak related anxiety test are less likely to engage in hygienic behaviors (such as hand washing), are less likely to comply with requirements to keep their body distance, are less likely to get vaccinated if available. On the other hand, people who got higher scores are more likely to engage in destructive social behaviors such as panic buying and unnecessarily rushing into hospitals and clinics when they misinterpret their own minor ailments as signs of a serious infection. Given the role of anxiety and it's ability on shaping behavioral responses to viruses, both behaviors can be alleviated as well as those facilitated the spread of infection are critical for public health policy makers, health officials, and health care providers to understand the nature and extent of adverse psychological responses to the current COVID-19 crisis (Steven Taylor, Caeleigh A. Landry, Michelle M., 2020).

Furthermore, many universities abruptly switched to online teaching in March 2020. During this period, the closure of bars, restaurants, parks, gyms and other recreational stores has greatly changed the family, school, work and social life of college students. It is expected that these factors could have significant impact on the mental health of students. Especially students come from less privilege background (Aucejo et

al., 2020). Moreover, 1.5 billion students now are experiencing serious psychological distress due to the deprivation of normal education (Lee., 2020). Furthermore, their daily routines also changed by lack of outdoor activity, disturbed sleeping patterns that influence student's mental health (Cao et al., 2020). Over half of students reported that they are not utilize their time during the period of lockdown, and their daily exercise routine has been interrupted (Chaturvedi, K et al., 2020).

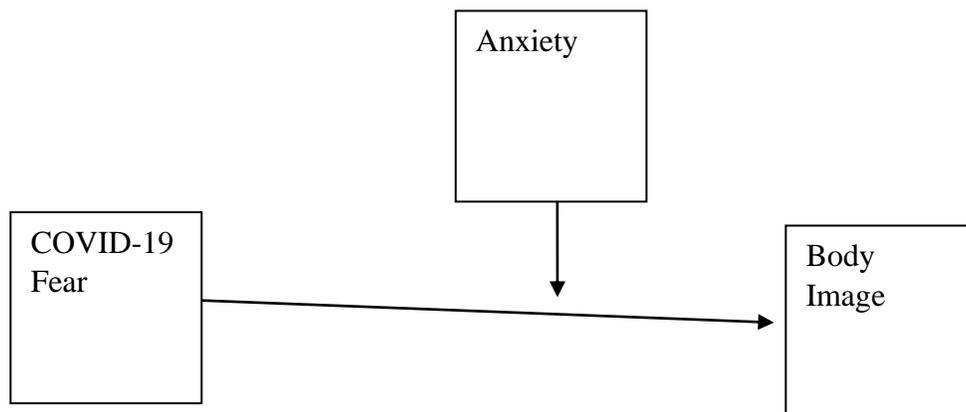
According to sociocultural models, body image dissatisfaction may come from the perceived stress from surroundings, such as family members, friends and media. The individual may internalize social portrayed perfect body image as their ideal body appearance, their central self-worth and goal. (Fitzsimmons-Craft et al.,2012; Stice., 2001). However, such ideal body image also induce the comparisons with others and also, body surveillance (perceived failure to meet ideal body look or admired body appearance; Fitzsimmons-Craft et al., 2012). Thus, body surveillance increase body dissatisfaction accompanying with negative emotions, feelings, depressive symptoms, poor self-esteem and also, anxiety (Stice, 2001).

There was a research argued that changes in women's menopause can change their body appearances and function so that anxiety and depression may showed up. 307 women has been included in this study and result suggested negative relationship between body image and anxiety scores, they also found that body image is a predictor of anxiety (Simbar, M., Nazarpour, S., et al. 2020). Another research talked about body appreciation. Body appreciation includes an individual's perception of his or her body, the ability to accept and respect the imperfections of his or her body, to behave positively

and healthily on a daily basis, to protect his or her body image at all times, and not to be easily influenced by the ideal body image created by society and culture (Avalos, Tylka, & Wood-Barcalow, 2005). Body appreciation is also related to depression and anxiety (Ramseyer Winter, Gillen, Cahill, Jones, & Ward, 2017).

Previous research mostly focus on women, here is a research tested the relationship between body image and anxiety in adolescent population that including both women and man. Higher body image dissatisfaction group showed higher initial symptoms of generalized anxiety disorder, panic disorder, and social anxiety disorder (Vannucci, A., Ohannessian, C.M. 2018).

Hypotheses 2: Anxiety moderates the relationship between COVID fear and body image.



2.7 Physical activity on the relationship between COVID-19 fear and body image

Maintaining a healthy and active lifestyle is a challenge for all Americans. In the United States, 2018 Physical Activity Guidelines for Americans, which recommend adults get at least 150 minutes of moderate-intensity aerobic physical activity or 75 minutes of high-intensity physical activity, or an equivalent combination, each week.

The CDC's 2018 Physical Activity Guidelines for Americans reports that participation in regular physical activity reduces symptoms of anxiety in adults and older adults and reduces the risk of both developing depression and improving many of the symptoms of depression. Physical activity also lowers the risk of developing cognitive impairment, such as dementia, including Alzheimer's disease.

However, with the COVID-19 pandemic and lock down, there are less activities and more weight gain among population. Covid-19 influenced weight-related behaviors such as eating habit, exercise is still unclear. However, with the beginning of the Covid-19, food supply interruption may cause panic buying related to food that uneasy to get (M. Tan., F.J. He, G.A. 2020).

Also, the access to weight management program has been seriously impacted by the pandemic. In the UK, the bariatric surgery services and outpatient clinics were suspended to expand the necessary care and support toward COVID-19 patients. A study tested 41 obesity children and adolescents and found increased consumption of snacks and junk food with decreased time exercises. In one British study, obese adults were more likely to report that they believed some typical weight-gain prevention behaviors including

physical activity were lower than they had been before the blockade. (Robinson, Gillespie, & Jones, 2020). Even though the study doesn't include widely used measures of physical activity, diet during social lockdown (Garg et al., 2020).

Another study tested weight-related behaviors and weight management barriers. The research found that large portion participants reported negative changes in experiencing barriers to weight management, such as exercise, eating and snacking. the elevated report of frequency of overeating. The research argued that COVID-19 crisis was predictive of higher overeating behavior and lower physical activity during the pandemic (Robinson, E., Boyland, E., Chisholm, A., et al., 2021)

Due to the Covid-19, people are highly recommended to stay at home. Governments take an action to lock down entertainment business for safety reason. Although these actions slow down the speed of spread virus, they also bring another health issues and influence people's psychological well-being. When people spend most of time stay at home, they may spend less time doing exercises. Plus, social isolation may also influence their mental disability by affecting peer relationships. People may spend much time on viewing screens, and their sleep quality can be somehow influenced (Wang G., Zhang Y., et al., 2020).

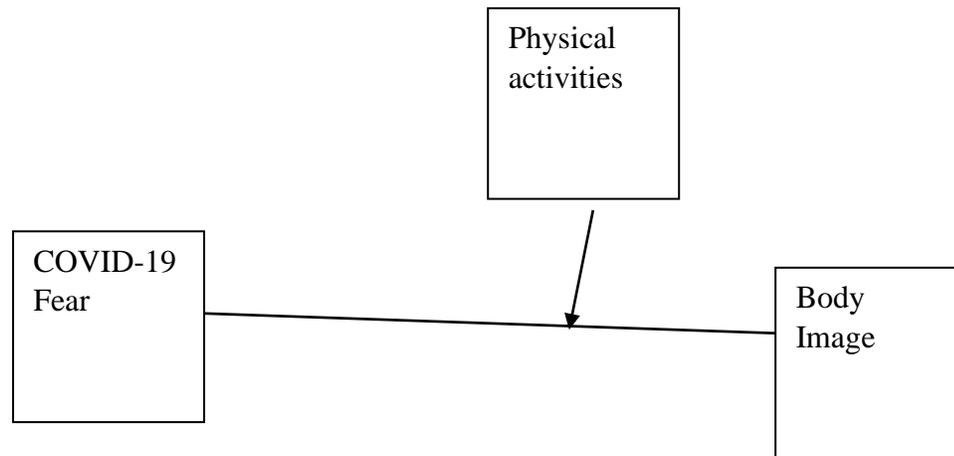
Additionally, social isolation and quarantine are defined secondary effects of reactive psychiatric symptoms (Sani G., Janiri D., et al, 2020). These symptoms are related to the changed eating and exercise patterns. A research found out increased restricted eating and binge eating behavior appeared among the general population during the pandemic. Moreover, the frequencies of exercise decreased during the Covid-19

pandemic (Phillipou A., Meyer D., et al, 2020). Another researchers evaluated pandemic impact on people with eating disorders. The results suggested elevated food restriction and increased fears about finding food. The subjects also showed concerns about relapse.

A researcher observed three adolescent Muslim girls with anorexia nervosa symptoms. Their symptoms occurred suddenly in April 2020 during the pandemic. These three girls just finished fasting during the Ramadan. But they did not change back to their normal meal plan after fasting. On contrary, they continued to eat one meal per day and did excessive exercise because of the fear of weight gaining. Their fasting behavior gradually turned into preoccupied thoughts overweight loss, restricted eating. Social isolation may contribute to their symptoms because all of them reported withdrew from their family and peers, unable to join the online class, and frequent weighed themselves (probably every day). They spend a lot of time on checking mirrors, calculating calories, and watched videos about eating and food recipes (Ünver, H., Arman, A. R., et al., 2020).

In conclusion, physical activities may provide negative influence on self-perceived body image among people with eating disorder. It comes from the social isolation, fear of get contaminated by virus and change of lifestyle. However, previous research mainly focused on ED patients, the research conducted on normal population has not been found. In this research, we mainly tested moderate effect of anxiety and physical activities on body image during Covid-19 pandemic. Anxiety has been tested by the Anxiety scale, body image was tested by Body image questionnaire, and physical activity behavior was monitored by Physical activity scale. In addition to these scales, we also used COVID fear scale to test influence among pandemic period.

Hypothesis 3: Physical activity moderates the relationship between COVID-19 fear and body image.



While ensuring physical health, people spend more time at home. However, many psychological problems have not been addressed. Because of the fear of infection, some people who like outdoor sports, or are used to going to the gym, have their lives affected and can't do exercise in the way they used to. At the same time, people spend more time on social media, and the image of the perfect body promoted by social media also increases stress related to body image. In addition, the anxiety associated with fear of COVID-19 may also affect people's mental health, leading to more negative body evaluations. This research mainly tested the relationship between Body Image and COVID-19 fear, also including physical activities and anxiety as moderator effects to provide farther understanding of body image during COVID-19, and expecting to implement pandemic-related body image concern in future treatment.

CHAPTER 3. METHODOLOGY

3.1 Participants

Total 630 college and graduate students were recruited in this study. However, since 54 questionnaires were not full filled, these data were excluded from data analysis, total 576 valid data were used in this research. Participant's ages are more than 18 years old. Participants include White/European American, with other racial/ethnic minorities.

3.2 Instruments

3.2.1 COVID fear scale

The survey questionnaire contained 7 questions to test participants' health condition during the COVID-19 period. This survey was translated from FCV-19S Japanese version by Ahorsu et al. Answers are scored from 1 to 5, 1 indicates "Strongly disagree" and 5 reflects "strongly agree". The questionnaire tested fear in thoughts, physical symptoms, life change, media influence and feelings related to COVID-19 (Koubun Wakashima., et al. 2020).

3.2.2 Generalize anxiety disorder scale

GAD-7 is a self-report questionnaire. The GAD-7 is designed according to the description of DSM-IV. Total seven items contained in this questionnaire that indicating

different symptoms of anxiety disorder. There were four options range from 0 to 3 showing frequency of symptoms, 0 reflects not at all, 1 reflects several days, 2 reflects more than half the day, and 3 reflects nearly every day. Total score provides a possible score from 0-21, 0-4 indicates minimal anxiety, 5-9 indicates mild anxiety, 10-14 indicates moderate anxiety, and 15-21 indicates severe anxiety.

3.2.3 Physical Activity Level

The PAL contains 2 part of questions. It can be conducted either telephone or self-administered methods. This questionnaire will test the physical activity's frequency and duration and activity. It is also included participants who are not able to do exercise because of medical condition or other physical reason. The type of physical activity including: brisk walking, aerobics, dance, run, bicycle, team sports, yoga, stretching, T'ai Chi Chaun, weight lift, swimming, skiing, rope jumping, and other activities.

3.2.4 Body image questionnaire

This questionnaire used self-report measure to test body-image disturbance. The total 19-item mainly asked avoidance behavior/ situation that related to concerns about body appearance, eating behavior, and social behavior, such as avoidance of tight, tiny cloth, engage into fasting or restrict eating, or do not go out socially if others are thinner. The body image avoidance questionnaire has sufficient internal consistency and retest reliability ($r = 0.87$). This measure was highly correlated with negative attitudes to weight and shape and with perceived distortions to size. It distinguished women with bulimia nervosa from a control group who were sensitive to changes after treatment for severe body image disorders and were consistent with external raters. Scores ranged from zero

to five, based on different statement's, 5 means always, 4 means usually, 3 means often, 2 means sometimes, 1 means rarely, and 0 means never. Body image questionnaire has good internal consistency and test-retest reliability (James C., Rosen., et al. 1991).

With higher score on this questionnaire, it indicated more negative responses, and these responses were also associated with more intense body dissatisfaction, fear of fatness, feelings of low self-worth because of appearance, greater importance placed on body shape and weight, and desire to lose weight.

The scale could also be divided into four subscales, from 1 to 4 are clothes avoidance, which could be described as using clothes to cover body and avoiding direct confrontation. Second subscale is from 5 to 7, which describes body avoidance by food restriction. The fourth subscale is from 8 to 11, which describes social avoidance because of body image concerns. last subscales including 12 to 19, which describes avoidance behavior that people chose to do due to body image concerns.

3.2.5 Demographic Questionnaire

The demographic questionnaire will include questions regarding race/ethnicity, age, gender, sexual orientation and relationship statues. No identifying information will be collected in this part.

3.3 Procedure

An online based study was conducted to test the moderate effects of anxiety and physical activities on the relationship between fear of COVID-19 and body image. Questionnaire was made on Qualtrics and would be sent across the whole country.

Voluntary participants would have a link that direct them to an internet address where they could complete the survey. Before started the survey, the consent form was required to complete by participants, if they clicked “Agree” button, then they would be directed to the online-based survey. However, if they clicked the other options that they don’t want to join this research, they will be directly conducted to the end of survey, and data would not be coded as valid data. Those who accepted the consent form were then directed to 5 parts questionnaires. The first part was demographic information, included age, ethnicity, gender, sexual orientation and relationship statues. Second part of questionnaires was COVID-19 fear questionnaire, The questionnaire tested fear in thoughts, physical symptoms, life change, media influence and feelings related to COVID-19. Next one was Body Image Avoidance questionnaire, this questionnaire used self-report measure to test body-image disturbance. The total 19-item mainly asked avoidance behavior/ situation that related to concerns about body appearance, eating behavior, and social behavior. GAD-7 was used to test generalized anxiety disorder, Total score provides a possible score from 0-21, 0-4 indicates minimal anxiety, 5-9 indicates mild anxiety, 10-14 indicates moderate anxiety, and 15-21 indicates severe anxiety. The last part of questionnaires was Physical Activities questionnaire, mainly tested physical activity type, duration and frequency.

The whole process might take less than 5 minutes to complete and identifying information would not be collected during the whole process. However, since this research also provided 6 \$5 and 2 \$10 gift cards, participants who wanted to receive \$5-10 gift cards were encouraging to leave their e-mail address at the end of survey.

3.4 Data Analysis

SPSS-15 software is used to analyze the quantitative data. Descriptive statistics (including mean, standard deviation, skewness, and kurtosis) were conducted to summarize characteristics of the sample. These characteristics including age, gender, relationship statuses and ethnicity. Correlation test was conducted to test the relationship between COVID-19 fear score and Body image avoidance score. Moreover, Pearson's correlation test was chosen in this research given that both COVID19-fear score and body image score followed normal distribution.

Regression test was conducted to test the mediate effects of Anxiety and Physical Activity. In linear regression test, Body image was considered as outcome, COVID-18 Fear was predictor, both Generalized anxiety and Physical activity level were considered as moderator variables in order to test moderate effects on the relationship between Body Image and COVID-19 Fear.

3.5 Results

3.5.1 Sample characteristics

Table 1. Race among College students. (N = 576)

Race/Ethnicity	Percentage (%)	Mean (SD)	Missing (%)
American Indian	6.1		
Asian	11.8		
Biracial/Multiracial	11.6		
Black	5.6		

Hispanic/Latino	7.5		
Native Hawaiian/other Pacific Islander	2.4		
White	53.6		
Other	1.4		
Total	100.0	5.25(2.19)	0

Descriptive statistics: among 576 participants, 53.6% were White, 11.8% were Asian, 11.6% were Biracial/Multiracial, 7.5% were Hispanic/Latino, 6.1% were American Indian, 5.6% were Black, 2.4% Native/Hawaiian/Other Pacific Islander, and 1.4% Other.

There are 109 participants age from 18 years old to 22 years old, were 18.9% of total population, 294 participants from 22 years old to 26 years old, were 51.2% of total population, and 171 participants age are above 26 years old occupied 29.7% of total population.

As for gender, there are 290 participants identified as women occupied 50.3% of total population, 210 participants self-identified as men that occupied 36.5% of total population, 25 participants of 4.3% identified as Non-binary/third gender, and 51 participants of 6.9% prefer not to say.

Table 2. Age, Gender and physical activities among College students. (N = 576)

Variable	Percentage (%)	Frequency	Missing (%)
Age			0.3
18-22	18.9	109	
22-26	51.2	294	
Above 26	29.7	171	
Gender			0
Women	50.3	290	
Man	36.5	210	
Non-binary / third gender	4.3	25	
Prefer not to say	6.9	51	
Exercise regularly	91.1	525	
Not exercise regularly	8.9	51	0
Physical activity			

3.5.2 Relationship between Body Image and COVID-19 fear

Table 3. Covid-19 fear, Body image and Generalized Anxiety among students. (N = 576)

Variables	Mean (SD)	Skewness	Kurtosis
COVID-19 Fear	23.87(5.97)	-0.23	-0.07
Body Image	44.10(15.65)	-0.02	0.45
Generalized Anxiety	8.31(4.34)	0.05	-0.27

Table 4. The relationship between COVID-19 Fear and Body Image (N = 576)

Variables	Mean	SD	Body Image	COVID-19 Fear
COVID-19 Fear	23.87	5.97	0.473**	-
Body Image	44.10	15.65	-	0.473**

Descriptive statistic: 576 valid participants were included in this research, body image (Skewness = -0.02, Kurtosis = 0.45, mean = 44.10, SD = 15.65) and COVID-19 fear (Skewness = -0.23, Kurtosis = -0.07, mean = 23.87, SD = 5.97) followed normal distribution. Thus, Pearson’s correlation was conducted below. Pearson’s correlation: COVID-19 Fear was significantly related to Body image (p = 0.473, P < 0.01) the result indicated higher COVID-19 fear was associated Higher body image.

Table5. mean of body image avoidance difference among race groups. (N = 576)

Variables	1	2	3	4	5	6	7	8
1	1.00	1.84	0.37	3.06	11.11*	10.44	-0.11	7.68
2		1.00	2.21	4.897	-9.27*	-8.60	1.73	9.52
3			1.00	2.69	11.48*	10.81	-0.48	7.31
4				1.00	14.16*	13.50	-3.17	4.63
5					1.00	0.66	10.99*	18.79*
6						1.00	10.34	18.13
7							1.00	7.80
8								1.00

1 = American Indian or Alaska Native 2 = Asian or Asian American 3 =
Biracial/Multiracial 4 = Black or African American 5 = Hispanic or Latino/a
6 = Native Hawaiian or other Pacific Islander 7 = White 8 = Other (Please specify)

We used ANOVA to compare the means of body image avoidance across race/ethnicity type subgroups. In addition, we conducted post hoc analyses for pairwise comparison of the means. The result showed that: the mean of body image among Hispanic or Latino group was significantly higher than that other groups except Native Hawaiian or Other Pacific Islander. The mean of body image among Hispanic or Latino Group was significantly higher than American Indian or Alaska Native (MD = 11.11, $P < 0.05$), than Asian or Asian American (MD = 9.27, $P < 0.05$), than Multiracial (MD = 11.48, $P < 0.05$), than Black or African American (MD = 14.16, $P < 0.05$), than white (MD = 10.99, $P < 0.05$), than other race group (MD = 18.79, $P < 0.05$)

3.5.3 Anxiety and physical activity level on the relationship between COVID-19 Fear and Body Image

Table 6. Moderate effects of Anxiety on the relationship between COVID-19 Fear and Body Image (N=576)

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig	F
	B	Std. Error	Beta			
COVID-19 Fear	0.78	0.15	0.30	5.16	0.00	92.85**
Generalized Anxiety	0.44	0.47	0.12	0.92	0.36	
Interaction : Fear_Anxiety	0.03	0.02	0.25	1.68	0.09	

Anxiety, which was the significant predictor of body image, was selected to act as moderator, in the relationship between COVID-19 fear and body image. Generalized Anxiety are not significantly related to Body Image ($P = 0.36$), The positive B-coefficient for the interaction Fear-Anxiety indicates that the relationship between COVID-19 Fear and Body Image has not been influence by increasing Generalized Anxiety ($\beta = 0.25$, $F = 93.85$, $P = 0.09$).

Table 7. Moderate effects of Anxiety on the relationship between COVID-19 Fear and Body image Subscale 1

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig	F
	B	Std. Error	Beta			
COVID-19 Fear	0.11	0.04	0.18	2.52	0.01	25.10**
Generalized Anxiety	0.06	0.12	0.07	0.47	0.64	
Interaction : Fear_Anxiety	0.004	0.06	0.16	0.97	0.34	
Interaction : Phy_Cov	0.02	0.02	0.05	0.88	0.38	

Generalized Anxiety are not significantly related to Body Image subscale 1 ($P = 0.64$), COVID-19 fear are significantly related to Body Image subscale 1 ($P < 0.05$). The positive B-coefficient for the interaction Fear-Anxiety indicates that the relationship between COVID-19 Fear and Body Image subscale 1 has not been influenced by increasing Generalized Anxiety ($\beta = 0.16$, $F = 25.10.10$, $P = 0.34$). Physical activity level do not showed significantly effects on the relationship between COVID-19 fear and Body image subscale 1 ($B = 0.02$, $\beta = 0.05$, $P = 0.38$).

Table 8. Moderate effects of Anxiety on the relationship between COVID-19 Fear and Body image subscale 2.

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig	F
	B	Std. Error	Beta			
COVID-19 Fear	0.06	0.04	0.12	1.78	0.08	52.98**
Generalized Anxiety	-0.02	0.10	-0.03	-0.19	0.85	
Interaction: Fear_Anxiety	0.01	0.004	0.38	2.39	0.02	
Interaction: Phy_Cov	0.05	0.02	0.14	2.86	0.004	

Generalized Anxiety are not significantly related to Body Image subscale 2 ($P = 0.85$), COVID-19 fear are not significantly related to Body image subscale ($P = 0.08$). The B-coefficient indicates interaction Fear-Anxiety that Anxiety significantly increases the relationship between COVID-19 fear and body image subscale 2 ($B = -0.02$, $\beta = -0.03$, $P < 0.05$). Interaction Phy-Cov indicates that Physical activities level significantly increase the relationship between COVID-19 fear and body image subscale 2 ($B = 0.05$, $\beta = 0.14$, $P < 0.01$).

Table 9. Moderate effects of Anxiety and physical activities on the relationship between COVID-19 Fear and Body image subscale 3

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig	F
	B	Std. Error	Beta			
COVID-19 Fear	0.12	0.05	0.17	2.55	0.01	55.56**
Generalized Anxiety	0.02	0.13	0.02	0.16	0.88	
Interaction: Fear_Anxiety	0.01	0.005	0.30	1.92	0.056	
Interaction: Phy_Cov	0.07	0.02	0.15	2.90	0.004	

Generalized Anxiety are not significant related to Body Image avoidance subscale 3 ($P = 0.88$), COVID-19 fear are significantly related to Body Image avoidance subscale 3 ($P < 0.01$). The B-coefficient indicates interaction Fear-Anxiety that Anxiety do not increase/decrease the relationship between COVID-19 fear and body image subscale 2 ($B = 0.01$, $\beta = 0.30$, $P = 0.06$). Interaction Phy-Cov indicates that Physical activities level significantly increase the relationship between COVID-19 fear and body image subscale 3 ($B = 0.07$, $\beta = 0.15$, $P < 0.01$).

Table 10. Moderate effects of Anxiety and Physical activities on the relationship between COVID-19 Fear and Body image subscale 4.

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig	F
	B	Std. Error	Beta			
COVID-19 Fear	0.30	0.08	0.25	3.90	0.000	66.86**
Generalized Anxiety	0.53	0.21	0.33	2.50	0.01	
Interaction: Fear_Anxiety	0.002	0.008	0.04	0.24	0.81	
Interaction: Phy_Cov	0.09	0.04	0.10	2.03	0.04	

Generalized Anxiety are significantly positive related to Body Image Subscale 4 ($P < 0.05$), COVID-19 Fear are significantly related to Body Image Subscale4 ($P < 0.01$). The B-coefficient indicates interaction Fear-Anxiety that Anxiety do not significantly related between COVID-19 Fear and Body Image Subscale 4 ($B = 0.002$, $\beta = 0.04$, $P = 0.81$). Interaction Phy-Cov indicates that Physical activities Level significantly increase the relationship between COVID-19 Fear and Body Image Subscale4 ($B = 0.09$, $\beta = 0.04$, $P < 0.05$)

Table 11. Moderate effects of Physical Activities on the relationship between COVID-19 fear and Body Image

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig	F
	B	Std. Error	Beta			
COVID-19 Fear	1.28	0.36	0.49	3.60	0.00	56.86**
Physical activity	5.93	8.34	0.11	0.711	0.48	
Interaction: Fear_Activity	-0.07	0.37	-0.04	-0.20	0.84	

For body image, the regression analysis with the interaction term (COVID-19 fear x physical activity) revealed there was no significant moderate effects of physical activities on the relationship between COVID-19 fear and body image ($F = 56.86$, $p = 0.84$). The interaction term did not predict body image.

CHAPTER 4. DISCUSSION

The study explored the relationship between COVID-19 fear and body image, also including moderate effects of anxiety and physical activity. First hypothesis was supported but the last two hypotheses were rejected. There was a significantly positive relationship between COVID-19 fear and Body image avoidance. Both Anxiety and Physical activities do not significantly influence the relationship between COVID-19 fear and Body image.

Our research indicated that COVID-19 fear and Body image avoidance has a significant positive relationship. Such a finding is consistent with the current studies. In women, COVID-19-induced anxiety and stress were linked to a greater desire to be thin, the study found (Ouyang, Y., et al. 2020).

The study also found a significant correlation between anxiety and body dissatisfaction. Among male participants, the study found that anxiety and stress associated with COVID-19 were associated with a greater desire for muscle, and anxiety was also associated with body fat dissatisfaction. However, for our second hypothesis, the mediate effects of anxiety on the relationship between COVID-19 fear and body image, we found that as a mediator variable, anxiety did not significantly influence both of those factors. The discrepancy may come from applying different questionnaires. In

our research, we use generalized anxiety scale, for previous, research, they used specific COVID-19 anxiety scale to test pandemic related anxiety.

Compared to the COVID-19 anxiety scale that asked questions like “How likely will you change your future travel, vacation, or shopping plans because of the coronavirus?” Generalized anxiety scale including more physical reactions that could also be used in clinical settings. In this case, generalized anxiety might focus more on symptoms instead of simply COVID-19 related anxiety. Thus, based on different direction and intensity, results might also differ.

We also found that comparing to other race groups, Hispanic group showed significant higher body image avoidance scores. There is no significant difference between other groups. This finding may indicate that Hispanic population may has more body image concerns, like intent to pick up clothes that could cover their bodies, avoid social situations that may talk about body concerns, engaging in fasting or food restriction behavior more than other groups. The culture influence may play a role here, however, our research only include small part of participants that identified as Hispanic. For future study, author recommend to include race difference into body image and disordered eating, especially toward Hispanic population.

In our research, we also divide body image avoidance questionnaire into 4 parts of subscales, from 1 to 4 are clothes avoidance, which could be described as using clothes to cover body and avoiding direct confrontation. Second subscale is from 5 to 7, which describes body avoidance by food restriction. The fourth subscale is from 8 to 11, which describes social avoidance because of body image concerns. last subscales including 12

to 19, which describes avoidance behavior that people chose to do due to body image concerns.

And also, our research tested body image by using a general body image avoidance questionnaire. This questionnaire mainly targeted body image avoidance behavior, especially in social settings, like “I wear big clothes”, “I wear dark color clothes”. Due to COVID-19 lock down, people have less time to go outside, so that they got less chance to pick clothes to cover their body, which might influence their scores. For previous research, they tested participant’s actual body weight and their perceived body weight, the result indicated that participants felt like the they are eating more, doing less activities and gaining more weight without actual weight change (Keel, P.K., 2020).

For body image avoidance behavior subscale, this scale is significantly positive related to COVID-19 fear and generalized anxiety, also, physical activity could increase the relationship between body avoidance behavior and COVID-19 fear. Body image avoidance behavior mainly include behavior like “I weigh myself”, “I am inactive”, “I avoid physical intimacy”, this result may come from quarantine, since people spend more time stay at home, they are easy to get scale, and less chance to do exercise, that is why people feel inactive. And for physical intimacy, this maybe two reasons behind it: people are fear of get contagious; people are worried that their body image being judged. This could explain why Body image avoidance behavior has been significantly related to COVID-19 fear and anxiety. Physical activities act as moderated effects on the relationship between body image avoidance behavior and COVID-19 fear indicate that

with increased physical activity, people may get more sense of control, and sense of being healthier, then their body image may be less troublesome.

We also found that physical activity and anxiety play moderate roles on the relationship between body image food restriction subscale and COVID-19 fear. This finding is same as previous findings that participants reported worries about eating during pandemic. This subscale mainly including the question like “I restrict the food I am eating”, “I fast for a day or longer” all demonstrates these concerns. Our findings that anxiety and physical activity level plays moderate effects on the relationship between COVID-19 fear and body image food restriction subscale, this finding provide future treatment concerns in treating disordered eating or BDD population. Not only COVID-19 fear could influence body image, but introduce anxiety as psychoeducation and recommend physical activities could help reduce body image concerns and also may help reduce COVID-19 fear. In future research, author highly recommend that therapist focusing on different part of body image concerns and help client talk through all of these parts.

Another research also tested muscle desire including in body image. They found that stress and anxiety might impact men's relationships with their bodies, particularly in terms of masculine body ideals. Given that masculinity typically emphasizes the value of toughness, self-reliance, and the pursuit of status, COVID-19-related stress and anxiety may be leading men to place greater value on the importance of being muscular (Ouyang, Y., et al. 2020). In conclusion, the different way we used to test different aspect of body image, the result might be differed.

As for our third hypothesis, Physical activities did not significantly influence the relationship between COVID-19 and Body image avoidance. Also, physical activities did not significantly relate to Body image avoidance. This result was also different from the previous study. There was a research that showed that Negative body image was linked to lower physical activity and sport participation. Also, positive body image was associated with greater participation in physical activity and sport (Sabiston, C. M. 2019). This discrepancy may come from the influence of COVID-19, since lock down individuals got less chance to participate in physical activity, some of them might not put their values on body image as much as before.

Our research results indicated that COVID-19 fear was positively related to Body image avoidance, but both generalized anxiety disorder and physical activity were not increasing or decreasing this relationship. The result showed us that body image, especially body image avoidance might come from fear, COVID-19 mainly included “fear of getting contagious”, “fear of losing life because of pandemic”. With increased fear, people might take reactions for that, such as spending more time at home, less engaged in social places, avoid social activity, and keep social distance. These actions were kind of related to body image avoidance questions, like “I avoid physical intimacy”, “I do not go out socially if I will be checked, or if people will talk about weight, or if people I am with are thinner than me”. This might explain the positive relationship between these two factors.

As for why physical activity level did not increase the relationship between COVID-19 fear and body image, there were two probable reasons. First, we tested

physical activity level by asking if participants exercise regularly. However, with the changed lifestyle among pandemic, they might acknowledge the question as whether they were able to do their regular exercise or not. Thus, the results could be different from our expectations. Second, both COVID-19 and body image avoidance were psychological. The main points of these two variables were uncomfortable feelings and people who perceived themselves with negative body images trying to avoid uncomfortable situations. Thus, physical activity could not either reduce the fear of getting contagious, or help them avoid uncomfortable situations, that was why we did not meet our hypothesis here.

The previous research found that stress and anxiety might impact men's relationships with their bodies, particularly in terms of masculine body ideals. Given that masculinity typically emphasizes the value of toughness, self-reliance, and the pursuit of status, COVID-19-related stress and anxiety may be leading men to place greater value on the importance of being muscular (Ouyang, Y., et al. 2020). This research tested body image in another direction, if people perceived their body image as “not perfect”, they would love to put effort working on their body, thus, they might be motivated to do more physical exercises.

Implication of education

This study was consistent with previous research that COVID-19 fear was positively related to body image. When college students who are interested in working with eating disorders or body image distortion population, students could combine those two factors together to broaden their understanding about client’s concerns. They could ask questions like “Are you afraid of COVID-19?” “How do you deal with that fear?”

“How do you think that fear of COVID-19 connecting with body image avoidance?”

“How do you feel when people ask you out?” These sample questions give both client and clinician a space to think about how those two factors work together impacting client’s life. For example, if people take COVID-19 fear as an excuse and tell themselves that the reason they do not go outside was because they were afraid of getting contagious, they might ignore the potential fact that they were avoiding social situations because they were worried about being judged. As a trainee in this area, we should acknowledge that even though clients just present one behavior, there were multiple motivations or reasons behind that behavior, the more we get to know, the more specific we could provide our service.

Clinical psychological interventions

Most people with body dysmorphic disorder (BDD) do not seek psychiatric/psychotherapy, but seek expensive surgical, dermatological and dental treatment in an attempt to repair the cognitive appearance defects (Phillips et al. 2000) that tend to exacerbate BDD symptoms. There are two empirical treatments for BDD: serotonin reuptake inhibitors (SRIs) and cognitive behavioral therapy (CBT). CBT for BDD usually begins with assessment and psychoeducation, during which the therapist explains and personalizes the CBT pattern for BDD. In addition, CBT usually includes techniques such as cognitive reconstruction, exposure and ritual prevention, and relapse prevention. The study also implicit that provide including COVID-19 fear as part of psychoeducation in treatment might help clients manage distorted body image. We

believed that talking about fear, anxiety and even changed lifestyle during pandemic might give client a chance to adapt to new lifestyle and also navigate stresses.

Also, increased screening time makes them easy to be exposed by media portrayed “perfect body image” and makes them even more scared of getting outside, also triggered body image avoidance behavior. So people could only stick on a limited amount of official information only and also with limited time surfing the internet. And also maintain a usual routine by having regular sleep and diet patterns. Trying to engage into online social activities more, such as having video time with friends and family members. Let them gradually get familiar with their looks on computers could be helpful.

During the pandemic, many people chose to work from home. Although work from home could reduce the risk of getting contagious, and reduce time spend on transportation, it also brings the new question “how do set up boundaries between work and life?” as in the previous study, clients reported that they ate more and did less physical exercise while in pandemic. That was part of the reason they reported perceived weight gain, this might be because they did not set up a clear boundary between life and work, so they could get everything they want to eat at any time while working.

In fact, the epidemic is shaping up to be a crisis of collective trauma. A collective trauma is a group, community, or any size group up to the e A collective trauma is a traumatic psychological effect shared by a group of people of any size, up to and including an entire society. T Although trauma is often seen as a psychological reaction of an individual, when experienced as a group, trauma can be a collective phenomenon, influencing the way communities behave, and potentially changing the course of global

history. While the term traumatic, severe psychological stress following an experience of a serious or life-threatening event sounds alarming, it is vital that we acknowledge the complexity of what is happening around us so that we can better understand its potentially serious consequences and act on them now and in the future. By supporting individuals and communities, we can hopefully mitigate negative traumatic reactions.

Limitations of present study and future research direction

There are several limitations to this study. First, this study mainly used body image avoidance questionnaire, this questionnaire mainly tested avoidance behavior instead of self-perceived body image. So participant's self-perceived body image could be unclear and if their self-perceived body image is same to actual body image still unclear. Because of this, we could only conclude that COVID-19 fear was positively related to body image avoidance behavior, but we could not say that these behavior was based on the body distortion, and also, we could not know that whether physical activity was related to body distortion, and how does anxiety influenced body distortion.

Moreover, this research tested if regular exercise could increase or decrease the relationship between body image and COVID-19 fear. However, with stay at home order, participant's exercise might also change. Simply asked regular workouts could not precisely test their actual workout patterns. Future research could focus on changing workout routine, and how it influences people's reaction to COVID-19.

Furthermore, Since body image avoidance is an important behavioral manifestation of body image interference, including cognitive, affective and behavioral expressions of body dissatisfaction (Stormer., Thompson.1996; Pellizzer et al. 2017).

Multiple studies have found a positive correlation between body image avoidance, eating disorders, and negative attitudes toward weight and body shape (Durso., Latner. 2008; Walker et al. 2018; Purton et al. 2019). The clinical sample with eating disorders was observed to be more likely to avoid body image than the non-clinical control group. Reduced avoidance of body image was an important predictor of improved eating disorders (Pellizzer et al. 2019). Future research could also focus on the COVID-19 fear or anxiety influence on eating disorders and negative thoughts. Also, how does physical activities work on these factors, and how to reduce body image avoidance into future treatment. Besides, the current study included a racially diverse sample, including Asian, Caucasian, Hawaiian/Pacific Islander, Hispanic/Latino, and multiracial participants, but the multiple groups were too small to permit analysis of a single ethnic group, and therefore the sample subject for the experiment was white. Testing current models of interracial mediation will allow researchers to work with diverse populations and confidently conceptualize the relationships between these individual variables of interest. Future research should enlist more individuals of different races to promote universalization of research results.

Also, although current study recruited participants older than 18 years old, since the participants were all currently enrolled college students, the majority age of population falls into 22-26 years old. In future study, researchers could recruit participants of different ages, such as children.

Moreover, the data collection was published on social media for recruiting college students. Although research has pointed out that this research only recruited current-

enrolled, full time college students, and set up screening out robot responses or multiple responses, we did not have strict process to filter out non-student participants. In future study, research should be more cautious about recruitment process.

Conclusion

This paper explored the relationship between COVID-19 and body image among college students, also including the moderating role of generalized anxiety and physical activities on the relationship between these two variables. The results of the present finding indicated that with increased COVID-19 fear, the body image avoidance will be increased. However, anxiety and physical activities did not increase or decrease the positive relationship between those two factors. The results of the present study encourage college counselor and clinician to focus on the connection between fear and body image avoidance. This research also provides broader knowledge under the COVID-19 background and suggests clinician incorporation psychoeducation to improve client's life during pandemic.

Future research will be needed to explore the COVID-19 anxiety and another direction of body image, physical activities level. Future research could also focus on the COVID-19 fear or anxiety influence on eating disorders and negative thoughts.

Ethics Statement

The studies involving human participants were reviewed and approved by the University of University of Denver Institutional Review Board. The participants were assigned electronic informed consent to participate in this study.

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