

**THE ASSOCIATIONS BETWEEN SELF-REPORTED ANXIETY SYMPTOMS AND
PHYSICAL ACTIVITY AMONG UNIVERSITY STUDENTS IN FINLAND**

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TIIVISTELMÄ

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Tässä tutkielmassa tutkin suomalaisissa yliopistoissa opiskelevien opiskelijoiden ahdistuneisuusoireiden ja liikunnan välistä yhteyttä. Ahdistuneisuuden lisääntyessä opiskelijoiden keskuudessa ja liikunnan ollessa todistetusti ahdistuneisuutta lieventävä tekijä, on tarkoituksenani selvittää, onko yliopisto-opiskelijoiden kohdalla tilastollisesti merkittäviä yhteyksiä ahdistuneisuuden ja liikunnan välillä. Tarkoituksenani oli selvittää, onko liikunnan määrä yhteydessä ahdistuneisuuden määrään, onko sillä eroa, harrastaako henkilö liikuntaa ohjatussa ympäristössä vai ei, tai onko sillä eroa, harrastaako henkilö liikuntaa yksilönä vai joukkue-/ryhmäympäristössä. Hypoteeseinani olivat, että liikunnan määrä korreloisi negatiivisesti ahdistuneisuuden määrän kanssa, ja että ohjatussa ympäristössä sekä joukkue-/ryhmäympäristöissä liikkuvat henkilöt kokisivat vähemmän ahdistuneisuutta.

Tutkimuksessa käytettiin kvantitatiivisia menetelmiä (SPSS), ja tutkimukseen osallistui 100 opiskelijaa. Aineisto kerättiin Webropol-nettikyselyllä. Hypoteesieni vastaisesti, liikunnan määrä ei korreloinut tilastollisesti merkitsevästi ahdistuneisuuden kanssa, eikä ohjatussa ympäristössä harrastettu liikunta ennustanut ahdistuneisuuden määrää. Kolmas hypoteesini toteutui, sillä joukkue-/ryhmäympäristössä liikuntaa harrastavien opiskelijoiden ja joukkue-/ryhmäympäristössä liikuntaa harrastamattomien opiskelijoiden välillä löytyi tilastollisesti merkittävä ero, joukkue-/ryhmäympäristössä liikuntaa harrastavien opiskelijoiden ilmoittaen kärsivänsä vähemmän ahdistuneisuudesta.

Tutkimuksen tulosten perusteella ehdotan, että tulevissa tutkimuksissa pyritään selvittämään tekijöitä, jotka liikunnan ohella vaikuttavat ahdistuneisuuden kokemiseen, sillä tämän tutkimuksen perusteella ei voi vielä suoria tehdä johtopäätöksiä siitä. Mitä enemmän asiaa tutkitaan, sitä paremmin voivat eri tahot myös tarjota tulevaisuudessa sopivia mahdollisuuksia osallistua liikuntaharrastuksiin, näin edistäen opiskelijoiden mielenterveyttä ja tätä kautta myös jaksamista opinnoissa sekä arjessa.

Asiasanat: Ahdistuneisuus, liikunta, yliopisto-opiskelijat, mielenterveys, joukkueurheilu, yksilöurheilu, ohjattu liikunta.

ABSTRACT

Marttinen, E (2024). The associations between self-reported anxiety symptoms and physical activity among university students in Finland. Faculty of Sport and Health Sciences, University of Jyväskylä. Master's thesis. 33pp.

In this thesis, I investigate the relationship between anxiety symptoms and physical activity among university students studying at Finnish universities. As anxiety is an increasing problem among students and exercise has been shown to alleviate anxiety, my aim is to determine whether there is a statistically significant association between anxiety and exercise among university students. My aim was to determine whether the amount of physical activity is related to the amount of anxiety, whether it makes a difference whether a person engages in physical activity in an organized environment or not, or whether it makes a difference whether a person engages in physical activity as an individual or in a group setting. My hypotheses were that the amount of physical activity would be negatively correlated with the amount of anxiety, and that the people who exercise in an organized environment or in a group setting would report lower levels of anxiety symptoms.

The data was analyzed by using quantitative methods (SPSS) and 100 students participated in the study, of which 50 were male, 49 female and 1, who left the question unanswered. Most of the participants were 26-29 years old (61%), and most of the participants were on their 6th year of studies or above (38%). The data was collected using a Webropol-online survey. Contrary to my hypotheses, the amount of physical activity was not statistically significantly correlated with anxiety, and physical activity in a supervised environment did not predict the amount of anxiety. My third hypothesis was met, there being a statistically significant difference between the people participating in group sports and those who did not, with the students participating in group sports reporting lower levels of anxiety.

Based on the results of this study, I suggest that future studies should seek to identify factors that, in addition to physical activity, contribute to the experience of anxiety, as no direct conclusions can be yet drawn from this study. The more research that is carried out, the better the various bodies will be able to offer suitable opportunities for students to participate in physical activities in the future, thus promoting students' mental health and, in turn, their ability to cope with their studies and daily life.

Keywords: Anxiety, Physical Activity, University Students, Mental Health, Group Sports, Individual Sports, Organized Sports.

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1 INTRODUCTION

Anxiety is a growing problem in students' lives. In Finland, rates of anxiety disorders among students have tripled during the 2000s, (Kunttu, Pesonen & Saari 2017, 84) and all students experience anxiety at some level from time to time. Many students experience anxiety in their everyday life, for example as a limiting factor in their ability to study and as a factor that undermines their well-being and quality of life (Lantto 2019, 28).

For many students, the pressures of studying cause stress and anxiety, and for many, social situations are seen as distressing (Kerola 2018, 48). Although anxiety and stress caused by studying is common, many people refrain from seeking help because, for example, stress and anxiety are perceived as part of studying and being labelled as mentally ill is perceived as shameful (Eisenberg et al. 2009).

Exercise has been shown to be linked to well-being in many ways. One important factor in the positive effects of physical activity on well-being is the opportunity it creates to experience a sense of community and to forge new social relationships. It has also been found to provide energy to cope with everyday life, and to support social interaction with other people outside of physical activity (Staal & Jespersen 2015). Physical activity has also been found to be associated with improved stress tolerance and lower levels of anxiety in students (Furong, Wenhao, Chepyator-Thomson & Schmidlein 2018). Anxiety can lead to a number of problems, such as substance abuse (Strandholm & Ranta 2013), sexual risk behaviour (Agardh, Cantor-Graae & Östergren 2012) or unhealthy diets (Ye, Wang, Qu, Yuan et al. 2016), as many people may try to channel their feelings of ill-being into pleasurable activities that, over time, only further undermine their well-being (Nydegger 2012, 3).

Although it is recommended that people suffering from anxiety disorder itself should seek professional help, which in many cases would be psychotherapy or medication (Nydegger 2012, 108), exercise is recommended to support the professional treatment (Suomen Lääkäriseura Duodecim et al. 2019). Exercise has been found to be an effective tool to support rehabilitation, as it reduces symptoms of anxiety (DeBoer et al. 2012). As anxiety is such a significant problem

among students, the purpose of this thesis is to identify the different factors associated with anxiety among students. In addition, I will identify the underlying mechanisms of factors that alleviate anxiety in physical activity in order to facilitate the provision of relevant physical activity advice to students with anxiety in the future.

In this thesis, I will be using quantitative methods to examine the associations between self-reported anxiety symptoms and physical activity among university students who study at Finnish universities. I hypothesize there to be a negative correlation between the amount of physical activity and self-reported anxiety symptoms, since previous research has found physical activity to play a significant role when recovering from anxiety (Staal & Jespersen, 2015). Although physical activity can help with anxiety symptoms, it is also important to take excessive or compulsive physical activity into account, since compulsive exercise has also been found to be associated with higher ratings of anxiety (Weinstein et al., 2015). Therefore, if recommending physical activity to someone dealing with or recovering from anxiety, it is important to take individual factors into account, for the physical activity to cause more positive than negative effects. Not all forms of exercise are suitable for everyone, and it is therefore important to be able to offer different forms of exercise to different people in order to maximize the positive effects of exercise for different people (Wininger 2007).

2 ANXIETY

2.1 What is anxiety?

Anxiety is an emotional state during which feelings of tension, unease or terror are experienced (Isometsä 2019). Anxiety can also include experiences of worry or even panic (Aalto et al. 2009, 35). Anxiety results from feelings of fear or threat, where the threat or fear is distorted or feels exaggerated (Nydegger 2012, 1). Anxiety can often be compared to a fear-like emotional state in the absence of an actual external factor (Isometsä 2019). However, it is possible to find a concrete object or factor if one sets out to search for it (Strandholm & Ranta 2013, 17). Anxiety itself can be uncomfortable, but on a small enough scale it can also be useful, for example as a concentration or performance-enhancing emotion (Healey 2014, 1). Occasional mild feelings of anxiety are normal in themselves (Isometsä 2019), and they are part of everyone's life (Aalto et al. 2012, 35).

Anxiety often leads to actions that consciously or unconsciously seek to avoid or control unbearable anxiety. This type of action may include, for example, avoiding situations in which anxiety could occur (Isometsä 2019). When people recognise that anxiety is starting, or it is growing unbearable, many people try to stop it as quickly as possible. However, this often leads to only a minor and temporary relief of anxiety (Nydegger 2012, 3.) This kind of avoidance behaviour should be addressed as early as possible, as its continuation may reinforce the belief that this behaviour is the only way to avoid anxiety or its progression to more severe anxiety. Some people may turn to drugs with the aim of self-medicating their anxiety away. However, this only works as a temporary remedy, often making the anxiety more severe (Haravuori, Muinonen, Kanste & Marttunen 2017, 65). Some people may focus their attention on television, computer, video games or even communication to distract themselves (Nydegger 2012, 3), and some may resort to eating or sex in addition to the previously mentioned substances (Haravuori et al. 2017) (Nydegger 2012, 3). Such attempts can create a momentary, artificial sense of calmness, making it easier to ignore the problem (Nydegger 2012, 3).

An anxiety disorder can be defined as anxiety that causes clear functional impairment and significant subjective suffering (Strandholm & Ranta 2013, 17), is long-lasting (Aalto et al. 2012, 35), recurrent, interferes with a person's life or well-being (Nydegger 2012, 2) or limits a person's social functioning (Isometsä 2019). Anxiety disorders are common mental health disorders that can limit the lives of people who suffer from them, impairing their functioning and quality of life (Aalto et al. 2012, 35.) An anxiety disorder can significantly impede friendships, and in the worst cases, can also prevent leaving home or carrying out other goal-directed activities (Strandholm, & Ranta 2013, 17). According to one description, severe anxiety can present as an insurmountable fear of losing control. This can be experienced, for example, as a huge flood of negative emotions or even a feeling of dying (Nydegger 2012, 2).

Research has identified biological, hereditary, and environmental causes of anxiety disorders. Biological causes may be related to the nervous system, the regulation of neurotransmitter function or the secretion of stress hormones. In terms of heredity, it is known that children of parents with an anxiety disorder are five times more likely to have an anxiety disorder than children of parents without it. Environmental causes may include trauma and stressful experiences or events that threaten safety, such as repeated substance abuse in the family (Strandholm & Ranta 2013, 28).

Generalized anxiety is a common anxiety disorder, which is often accompanied by other anxiety disorders or depression (Koponen 2019). It appears as anxiety and constant excessive worrying, and significantly impairs the life of the person affected (Aalto et al. 2012, 40). Often, the worry may be about one's own health, financial status (Koponen 2019) or the safety of one's family, without the person being able to identify any specific reason for the worry (Healey 2014, 1). In many cases, the concern is also about one's own future, and about things that one cannot know for sure or control (Strandholm & Ranta 2013, 23). Most commonly, generalized anxiety begins around the age of 20, but it can vary up to the age of 60, depending on the case. It is currently estimated to affect between 1.2% and 6.7% of the population (Koponen 2019).

Anxiety disorders are often treated with medication, psychotherapy, or both, depending on the situation (Nydegger 2012, 108). Psychotherapy aims to reduce feelings of insecurity and

anxiety sensitivity, and to develop the ability to manage difficult situations. Behavioral and cognitive therapies have produced positive results, as have various relaxation and mindfulness therapies (Koponen 2019), which help people learn to control their anxiety and reduce their own anxiety and fear (Nydegger 2012, 119). The aim of pharmaceutical drug therapies is to alleviate anxiety, often with the help of sedatives or various antidepressants (Koponen 2019).

2.2 Prevalence and causes of anxiety in students

In Finland, the prevalence of diseases among students has remained stable, with the exception of depression or anxiety disorder. The rates of anxiety disorder were about three times higher in 2016 than in 2000 (Kunttu et al. 2017, 84). None of the students who participated in a pro-graduate thesis (Lantto 2019) on university students responded that they never experience anxiety (Lantto 2019, 28). However, anxiety turned out to play a major role in students' lives, with some students reporting that they felt that anxiety acted as a limiting factor in their lives. It was perceived to undermine their own quality of life, as it was seen to have a negative impact on their own well-being. It was also perceived to impair the smoothness of studying and the general mood (Lantto 2019, 28). Kerola, in her pro-graduate thesis (2018), pointed out that anxiety can affect students' ability to cope with their studies in the form of avoidance and increased pressure (Kerola 2018, 48). If students experience anxiety, it also impairs their performance (Vitasari, Wahab, Othman & Awang 2010).

A study conducted in Malaysia (Vitasari et al. 2010) identified five major factors that contribute to anxiety among international university students. These factors were anxiety created by exam situations, anxiety created by giving presentations, anxiety created by difficult mathematical calculations, anxiety created by language studies and anxiety created by social situations (Vitasari et al. 2010). Academic performance and uncertainty about one's future have also been found to cause anxiety in students (Sadigh, Himmanen & Scepanisky 2014). The difficulty of performing and getting a grip on their studies causes stress for up to a third of students. (Kunttu et al. 2017, 84). If a student gets into a social situation that he or she is afraid of, it almost always causes anxiety. This can lead to facing the situation while suffering from feelings of anxiety or avoiding the situation altogether (Ayres & Bristow 2009, 46). Anxiety caused by

social situations or educational demands has been found to affect one's own learning, social relationships, and everyday activities (Kerola 2018, 48). Stress during studies has been found to increase anxiety (Lantto 2019, 43), and in Finland up to 33% of students reported suffering from high levels of stress in 2016 (Kunttu et al. 2017, 84).

Lack of social relationships seems to be associated with psychological ill-being (Kunttu et al. 2017, 112). In Finland, 4-10% of students feel that they do not have the opportunity to discuss personal issues with a close friend, they meet their friends less than once a month, or feel lonely (Kunttu et al. 2017, 78). Living alone and being a single parent are also believed to increase the risk of anxiety (Erola 2004). Direct emotional support, i.e., support from friends or family, has been found to alleviate students' anxiety. Even without direct support, the mere feeling of belonging or the experience of knowing that others are in the same situation and coping with it, can help students cope with anxiety (Kerola 2018, 49). Not knowing who to turn to with problems also predicts psychological symptoms (Haarala-Muhonen, Ruohoniemi, Parpala, Komulainen et al. 2016). Attachment to study communities is also predicted to have a positive effect on psychological well-being (Korhonen, Inkinen, Mattsson & Toom 2017, 2). International students may feel that they are in a minority position in their new home country, which can end up causing them anxiety. Students from different ethnic or religious backgrounds may also experience isolation and social awkwardness when dealing with people who are completely different from the ones they have associated with before (Iarovici 2014).

Since the year 2000, mental health problems have increased, especially among men (Kunttu et al. 2017, 84), but anxiety is found to be more common among women (Rantala 2019, 43). The lower prevalence of anxiety in men may be due, according to some estimates, to the fact that men may have a certain perception of the masculine stereotype. This view includes the idea that accepting or being aware of problems would indicate weakness or vulnerability (Healey 2014, 9.) Often students are aware of their own problem areas in life, and these often include factors related to studying and mental well-being. However, men were less likely than women to want help with their problems (Kunttu et al. 2017, 83).

Anxiety among students is also common in other countries. According to a study in Canada (Pirbaglou et al. 2013), up to 33% of first-year students suffer from moderate to high levels of depression or anxiety (Pirbaglou et al. 2013). In America, for example, anxiety is also common, and although many American students suffer from anxiety, relatively few seek effective treatment for these problems (Capron, Bauer, Madson & Schmidt 2018). Many students may avoid seeking help or support for the fear of shame or stigmatization that mental health problems may cause (Eisenberg, Downs, Golberstein & Zivin 2009).

There can be several reasons for anxiety, but a study published by Beiter et al (2015) identified the most common reasons for student disquietness. Factors that contribute to disquietness were also found to be associated with anxiety, and in this study the three most common reasons were academic performance, pressure to succeed, and concern about post-graduation plans (Beiter et al. 2015). Although disquietness is often linked to thoughts about one's future (Strandholm & Ranta 2013, 23) or performance (Beiter et al. 2015), many other factors also have an impact on anxiety. Social skills have been found to be associated with loneliness, and through this, also with anxiety (Moeller & Seehuus 2019). Students diagnosed with ADHD have also been found to have higher rates of anxiety than students without it (Nelson & Liebel 2018).

2.3 Effects and associations of anxiety

Anxiety is often linked to substance abuse (Strandholm & Ranta 2013, 26) and alcohol problems (Chinnecka et al. 2018), and for students, the fear of missing out on, for example, student social activities can cause anxiety. Fear of missing out is also associated with high alcohol consumption, and in these types of situations high alcohol consumption is driven by peer relationships as well as social factors. (Scalzo & Martinez 2017). Feelings of anxiety can also lead to increased substance use, with the goal that the substance will mask the anxious feeling, if only for a moment (Nydegger 2012, 3). Comorbidity of substance use disorders and anxiety disorders is also common (Levola, Lönnqvist & Niemelä 2019).

In addition to substance abuse, anxiety has been found to be associated with sexual risk behaviors, such as men being haphazardous with condom use (Agardh, Cantor-Graae &

Östergren 2012). When experiencing negative emotions, people may use sex as a source of well-being to focus their attention on something other than their anxiety (Hill et al. 2017). Some people may use eating as an escape from their negative emotions (Nydegger 2012, 3), and anxiety has also been linked to unhealthy diets (Ye et al. 2016).

There is also a clear link between anxiety and sleep. Anxiety is a major factor behind various sleep problems that affect sleep quality. Students with higher levels of anxiety sleep more intermittently (Sadigh et al. 2014) and have poorer sleep quality than those with lower levels of anxiety. (Taylor et al. 2011.) In addition to being associated with insomnia, anxiety can act as a risk factor for future insomnia, just as insomnia can increase the risk of anxiety in the future. Therefore, anxiety and insomnia, each alone, increase the risk that, over time, these two factors may lead to a condition in which they exacerbate each other in a cyclical manner (Jansson-Fröjmark & Lindblom 2007). In many cases, anxiety can lead to actions to manage anxiety, often ineffectively, all the while impairing one's sleep recovery (Sadigh et al. 2014.)

3 EXERCISE AND ANXIETY

3.1 Exercise as a factor mitigating anxiety

A study by Hallgren, Moss and Gustin (2010) found that people who exercise regularly report lower levels of anxiety than those who do not exercise regularly (Hallgren et al. 2010). Exercise can reduce anxiety in a variety of ways, and for this reason, research has not been able to identify any single factor that produces this effect (Anderson & Shuvakumar 2013). For many people, social relationships through physical activity are a relevant factor, but even this cannot be generalized to everyone (Laukkala & Kukkonen-Harjula 2019). Exercise has been shown to have a positive effect on psychological well-being over the long term, and for example, exercise at a young age predicts better psychological well-being later in life (Sacker & Cable 2006). People with previous experience of regular exercise may experience greater positive changes in their mood after effective exercise than those who are not regular exercisers. For those who do not exercise, anxiety may even worsen as a result of effective exercise (Hallgren, Moss & Gustin 2010). Even the mere thought of having to exercise can cause momentary anxiety for people who are not used to exercising regularly. It is therefore important to be able to advise different people on the most appropriate forms of exercise for them, as different forms of exercise can affect them differently depending on their background (Wininger 2007). As people continue to exercise, their physical fitness improves, which raises their threshold for more strenuous exercise, while also increasing their self-efficacy (Anderson & Shuvakumar 2013).

Although high levels of stress can act as a barrier to vigorous exercise (YTHS 2013, 17), exercise can also increase stress tolerance. Students' stress tolerance has been found to be related to how actively they engage in physical activity. Students' participation in physical activity is therefore also related to anxiety, with physical activity being negatively correlated to anxiety-levels (Furong, Wenhao, Chepyator-Thomson & Schmidlein 2018). Some students relieve their anxiety with lighter forms of exercise or relaxation in addition to fitness. For example, yoga, meditation, and deep muscle relaxation exercises have been found to have anti-anxiety effects (Oslund 2013, 82). Yoga classes have also been found to reduce anxiety related

to one's own appearance among students. Yoga classes reduced the experience of being judged for their appearance. This increased satisfaction with their own body and reduced anxiety about their own appearance (Gammage, Drouin & Lamarche 2016.) Mindfulness exercises have also been found to help students manage anxiety caused by adjusting to university (Dyorakova, Kishida, Li, Flavsky et al 2017). An American study on students (Liu & Chen 2011) has found that taichi and chigong exercises are also effective in relaxing and reducing anxiety (Liu & Chen 2011). Taichi and chigong are meditative forms of exercise, that e.g., emphasize body awareness, which have originated in China (Chan, Lee, Suen & Tam, 2010).

3.2 Exercise as a contributor to anxiety

Although exercise has been shown to be effective in reducing anxiety (Stonerock, Hoffman, Smith & Blumenthal 2015), it can also act as a contributor to anxiety. According to a study by Agostini, Boniffaz, Di Carrado and Perciavalle (2014), for example, athletes' mental health can deteriorate during a training period. Their study involved 15 professional female water polo players who were examined during a two-month training period. During this training period, the players were found to have elevated levels of anxiety. In this case, high-intensity exercise under excessive pressure did not seem to improve mental health (Agostini et al. 2014). A study published by Selmi et al. (2018) also showed that intensified training can lead to hostility, anger, anxiety, and depression (Selmi et al. 2018).

An athlete can be driven into a state of overload by excessive training, which can be referred to as burnout, prolonged fatigue, or unexplained under-performance. In Finland, this condition is commonly referred to as overtraining. This condition is the result of too high of a mental and physical workload in relation to the individual's ability to adapt. The mood-related symptoms of this overload condition may include a decrease in positive feelings and an increase in negative feelings. One example of these feelings is anxiety (Uusitalo, 2015).

In some athletes, participating in sports can also lead to eating disorders, in which case they may try to reduce calorie intake by vomiting, taking laxatives, starving themselves, or following an unhealthy diet (Atkinson 2019, 151.) Eating disorders have been found to be associated with

anxiety, and not only do those with eating disorders suffer more anxiety on average, but eating disorders also contribute to the onset of anxiety in the future, just as anxiety increases the risk of developing eating disorders (Pallister & Waller 2007). Student athletes in an American study were found to have higher rates of eating disorders than non-athletes in the same study (Atkinson 2019, 151).

It also matters what the person's reasons for exercising are. For example, many people feel that they have both the opportunity and the obligation to modify their appearance through exercise (Corazza et al. 2019), and for some, comparing their appearance to that of others can cause anxiety (Rothberger, Harris, Czech & Melton 2015). Similarly, studies suggest that exercise-addicted athletes do not derive the same benefits from sports as “regular recreational exercisers” do. A person with this type of addiction may also suffer from anxiety at the same time. If exercise is linked to exercise addiction in this type of case, the exercise may not alleviate symptoms of anxiety (Weinstein, Maayan & Weinstein 2015). Also, if exercise is compulsive and the main reason for engaging in it is to control anxiety, the problem should be treated by limiting exercise as an escape from anxiety and trying to control anxiety in other ways (Scharmera, Gorrell, Schaumberg & Anderson 2019). If a person uses only one way to manage their anxiety, they may be constantly reinforcing the belief that this is the only way to manage their anxiety (Haravuori et al. 2017, 65).

Before recommending exercise as a form of anxiety or stress relief for a person suffering from anxiety or stress, the background of the person should be investigated, so that they can be properly counselled about exercise. For example, it is important to know one's tolerance to heavy exercise so that the intensity of exercise is appropriate to the goals, since exercise with too high intensity may end up increasing the anxiety. Previous negative experiences of physical activity can also act as a factor in reducing the positive effects of exercise (Wininger 2007).

3.3 Exercise as a support for mental health rehabilitation

If a person suffers from an anxiety disorder, the problem should be treated with professional help, which in many cases means psychotherapy or medication (Nydegger 2012, 108). Exercise

should therefore not be used as a substitute for treatment, but it can be used as part of the overall treatment (Suomen Lääkärisseura Duodecim et al. 2019). People recovering from anxiety disorders have found that exercise has been successful in creating a “detachment” from their own worries and concerns, and through this it has been successful in reducing anxiety (DeBoer et al. 2012). In addition to providing a release from everyday worries, exercise can increase one’s feelings of being in control over their own life. People with mental health disabilities have found it easier to carry out everyday tasks thanks to physical activity. Cleaning the house, washing the dishes, cooking, and walking the dog have been found to be difficult to do in general, but after exercise sessions, people have found that they have the energy to do these tasks (Staal & Jespersen 2015).

People with mental disabilities have found that, in addition to providing them with good community experiences, physical activity has given them opportunities to build new social relationships. Exercise has been perceived as providing more energy for coping with everyday life and for social interaction outside of exercise (Staal & Jespersen 2015). Although the social aspect is an important factor in supporting and promoting mental health in people recovering from mental health problems (Staal & Jespersen 2015), exercise alone has also been found to have positive effects in rehabilitation interventions for depression and anxiety. A study by Aguinaga et al. (2018) found that a home-based exercise program alone has been shown to have a downward effect on anxiety symptoms (Aguinaga et al. 2018).

4 RESEARCH METHODS

The aim of this study was to examine the relationships between physical activity and anxiety among university students. The questions I aimed to answer were the following:

1. *What is the association between the self-reported amount of physical activity and the prevalence of self-reported anxiety symptoms among university students?*
2. *Are there differences in self-reported anxiety symptoms between university students who report taking part in organized sports and university students who do not?*
3. *Do university students who report mostly taking part in group sports report lower levels of anxiety symptoms than university students who report mostly taking part in individual sports?*

The reasons for conducting this study were my own interests regarding this topic and the scarcity of scientific research on this topic in Finland. One of the hypotheses were that the amount of self-reported physical activity and the amount of self-reported would correlate negatively since physical activity has been reported to decrease anxiety symptoms (Hallgren et al. 2010). Another hypothesis was that students who take part in organized sports would report lower levels of anxiety, due to physical activity being reported as alleviating anxiety (Hallgren et al. 2010) and since students taking part in organized sports would likely interact with other people at said organized sports. My third hypothesis was that people who take part in group sports would report lower amounts of anxiety, since social interaction has been reported to be a factor in alleviating anxiety for some people as well (Laukkala & Kukkonen-Harjula 2019).

4.1 Target group and data collection

The target group of this study were university students studying in Finnish universities. The occupation or nationality of the participants did not matter, since the only criteria was to be a university Student at a Finnish university. The data was gathered through a Webropol-survey

on the web, and the link to the survey was shared through my personal Instagram-page. As a motivating factor to participate in the study, the participants were given an option of joining a raffle to win movie tickets.

The questionnaire contained an information page with the aim of the study stated, and the participants were required to consent to the study by answering “Yes” to the first question ‘I have read and understood the information provided, and I voluntarily agree to participate in this study’, in order to progress with the survey. The next questions covered the sex, age, and the academic year of the participants. The options for sex were: ‘*male, female*’, for age: ‘*18-21, 22-25, 26-29, and 30 or above*’, and for academic year: ‘*1., 2., 3., 4., 5., and 6. or above*’.

To assess the amount of physical activity of the participants, the questionnaire included a Godin Leisure-Time Exercise-Questionnaire (Godin 2011). The Godin-questionnaire is a tool for assessing a total leisure activity score, which is calculated by multiplying and adding the amounts of exercise stated in the questionnaire, in a way that will be further explained in the chapter 4.2 – *Analyzing data*. The leisure activity score can be used to interpret how active or sedentary one is in their weekly life.

The page for the physical activity assessment had an information sheet on the top of the page, which said ‘*During a typical 7-day period (a week), how many times on average do you do the following kinds of exercise for more than 15 minutes during your free time (write on each line the appropriate number).*’ After that, there were three questions, the first one regarding strenuous exercise, the second one moderate exercise, and the third one mild/light exercise. Each question had a text box, where the participants could reply, how many times per week do they do strenuous, moderate, and mild/light exercise. The participants were given examples for strenuous, moderate, and mild/light forms of exercise to help them differentiate them from each other. The participants were not given the option to calculate their own total activity scores, for the sake of minimizing the risk of people calculating their own scores incorrectly.

To examine if the participants participated in any competitive sports or recreational sports, there were three questions: ‘*Do you participate in competitive sports?*’, ‘*Do you participate in*

non-organized recreational sports?”, and *“Do you participate in organized recreational physical activities?”*. Each question was followed by the option of either replying ‘No’, or, depending on the question, either *“Yes, competitive team sports”* and *“Yes, competitive individual sports”*, *“Yes, recreational team sports”* and *“Yes, recreational individual sports”*, or *“Yes, individual activities”* and *“Yes, group activities”*. The questionnaire also had additional text boxes for the participants to further specify, which sports/physical activities they took part of, if they replied with a ‘Yes’. The participants were also provided with examples of how different forms of exercise would fit in which category.

The anxiety symptom assessment was done by utilizing the GAD-7-anxiety scale (Spitzer et al. 2006). It contained 7 questions, which were all answered with a 4-point Likert-scale (0 – *Not at all*, 1 – *Several days*, 2 – *More than half of days*, 3 – *Nearly every day*). Above the questions, there was a text *“Over the last two weeks, how often have you been bothered by the following problems?”*. The seven questions were the following: *“Feeling nervous, anxious or on edge”*, *“Not being able to stop or control worrying”*, *“Worrying too much about different things”*, *“Trouble relaxing”*, *“Being so restless that it is hard to sit still”*, *“Becoming easily annoyed or irritable”*, and *“Feeling afraid, as if something awful might happen”*. The anxiety score can be calculated by adding each score of the questions together, but the participants of this study were not provided with the option to calculate their anxiety scores, in order to minimize the risk of errors in the calculations. The calculations of the anxiety scores will be further elaborated in chapter 4.2 – *Analyzing data*.

IBM SPSS (Statistical Package for the Social Sciences) Statistics (29)-software was used to analyze the gathered data. The Webropol-questionnaire was exported into an SPSS-file, which meant that there was no risk of me making typing errors while copying the responses of the questionnaire. I had to add two new variables to the SPSS-file, since the Godin Leisure Activity-score had to be calculated by me. The first of the new variables, the *leisure-time activity score* was calculated by multiplying the amounts of strenuous exercise by 9, moderate exercise by 5, and mild/light exercise by 3. After multiplying the scores, I added them together, resulting in the weekly leisure activity score. For example, if a participant reported to do strenuous exercise once (1) a week, moderate exercise twice (2) a week, and mild/light exercise four (4) times a

week, the calculation would go as the following: $(1 \times 9) + (2 \times 5) + (4 \times 3) = 31$. In this case, the leisure-time activity score would be 31.

The other one of the new variables, the anxiety score, was calculated by adding the scores of the Likert-scales together. For example, if a participant would've answered "Not at all" to all of the anxiety-related questions, their anxiety score would be: $0 + 0 + 0 + 0 + 0 + 0 + 0 = 0$, and if they answered "Nearly every day" to every one of the questions, their anxiety score would be: $3 + 3 + 3 + 3 + 3 + 3 + 3 = 21$.

4.2 Analyzing data

The first research question, "*What is the association between the self-reported amount of physical activity and the prevalence of self-reported anxiety symptoms among university students?*" was examined by doing a bivariate correlation test. No statistically significant correlations were between the self-reported amount of physical activity and self-reported anxiety symptoms.

The research question two, "*Are there differences in self-reported anxiety symptoms between university students who report taking part in organized sports and university students who do not?*" was analyzed by doing an independent samples t-test. The research question three, "*Do university students who report mostly taking part in group sports report lower levels of anxiety symptoms than university students who report mostly taking part in individual sports?*", was also analyzed by doing an independent samples t-test. The confidence interval for all the tests was 95%.

5 RESULTS

5.1 Participants

The study concluded of 100 participants, 50 of which were male, 49 were female, and 1, who left the question unanswered. Most of the participants were 26-29 years old (61%), and most of the participants were on their 6th year of studies or above (38%). 79 of the participants reported taking part in some form of organized sports, while 21 reported not taking part in organized sports. 46 of the participants also reported taking part in group sports, while 33 reported not taking part in group sports.

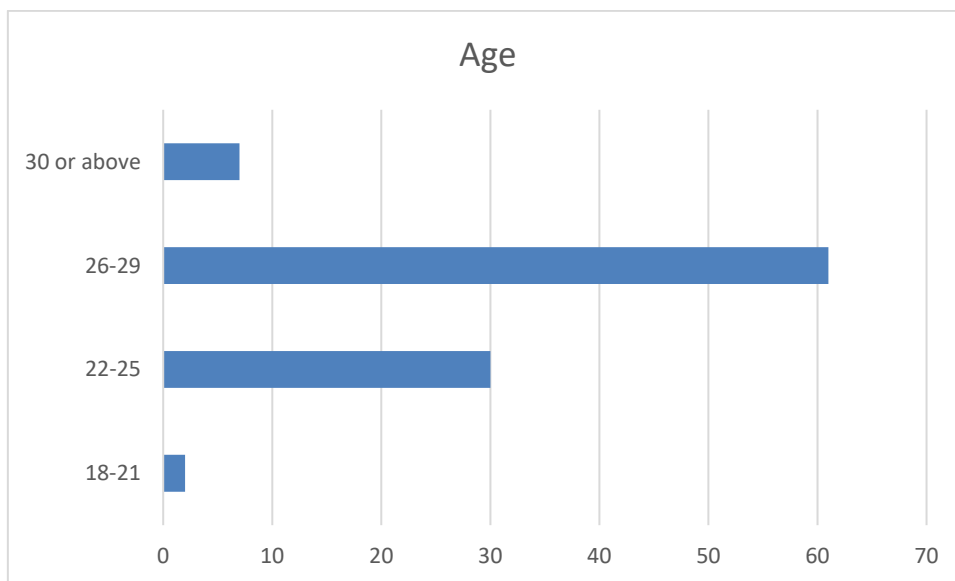


FIGURE 1. Age of participants

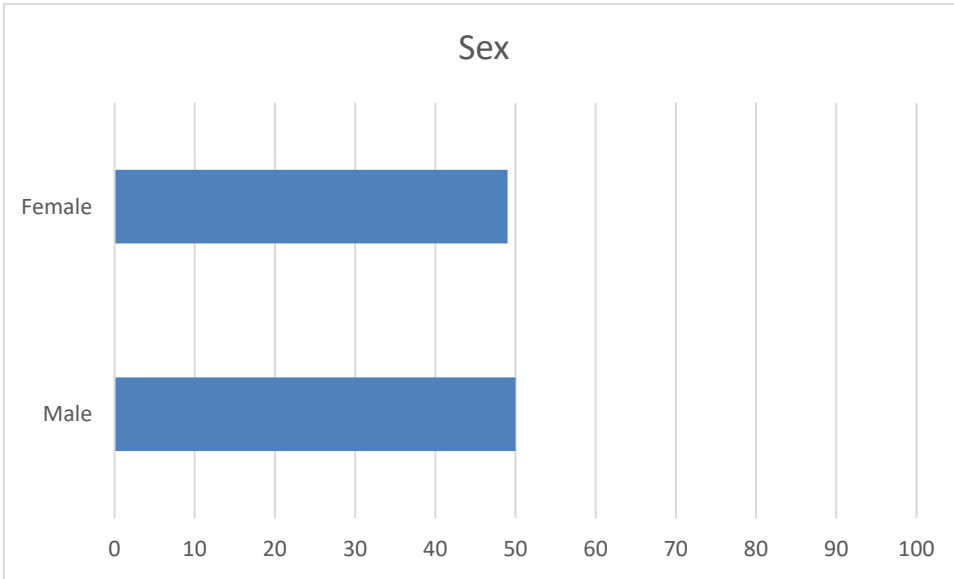


FIGURE 2. Sex of participants

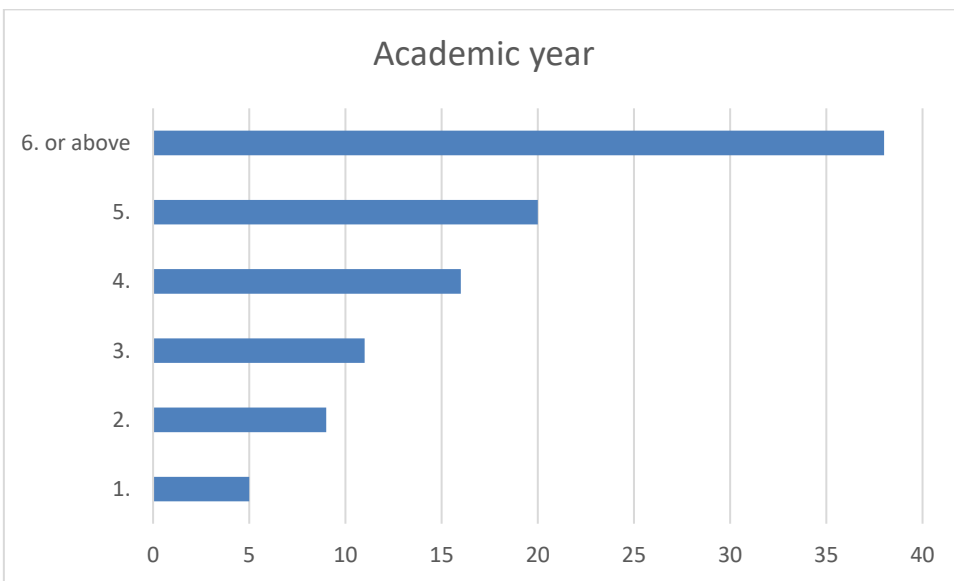


FIGURE 3. Academic year of participants

5.2 The association between the self-reported amount of physical activity and the prevalence of self-reported anxiety symptoms among university students

The association between the self-reported amount of physical activity and the prevalence of self-reported anxiety symptoms were analyzed by running a bivariate correlation between the anxiety score, the leisure-activity score, the amount of strenuous exercise, the amount of moderate exercise, and the amount of mild/light exercise. None of the variables had a statistically significant correlation with the anxiety score.

TABLE 1. Correlations and descriptive information between physical activity and anxiety symptoms Correlations, not p-values

Variable	<i>n</i>	<i>M</i>	<i>SD</i>	1	2	3	4
1. Anxiety symptoms ^a	100	5.37	3.59	—			
2. Total PA	100	48.79	27.18	-.169	—		
3. Light PA	100	4.25	3.62	-.136	.588**	—	
4. Moderate PA	100	2.69	01.84	.034	.734**	.245*	—
5. Strenuous PA	99	2.55	1.82	-.172	.850**	.191	.512**

* $p < .05$. ** $p < .01$.

5.3 Are there differences in self-reported anxiety symptoms between university students who report taking part in organized sports and university students who do not?

The independent samples t-test results did not show any statistically significant differences between the university students who reported taking part in organized sports and the students who reported not taking part in organized sports.

TABLE 2. Differences in anxiety between students taking and not taking part in organized physical activities (Independent samples t-test)

Logistic parameter	<i>Does not do organized PA</i>			<i>Does organized PA</i>			<i>t</i>	<i>p</i>	Cohen's <i>d</i>
	<i>N</i>	<i>M</i>	<i>SD</i>	<i>N</i>	<i>M</i>	<i>SD</i>			
<i>Anxiety total score</i>	21	4.905	3.477	79	5.494	3.626	-0.684	0.499	-0.164

Note. For the p-value and the t-value, the equal variances were not assumed, and the p-value was measured by doing a Two-Sided test.

5.4 Are there differences in self-reported anxiety symptoms between university students who report mostly taking part in group sports and university students who report mostly taking part in individual sports?

The differences between the university students who reported taking part in group sports and the students who reported taking part in individual sports were examined by an independent samples t-test. The participants who reported not taking part in organized sports were excluded from this t-test. The test revealed a statistically significant ($p = 0.045$) difference between the two groups, with the participants taking part in group sports reporting a lower level of anxiety than the ones taking part in individual sports.

TABLE 3. Differences in anxiety between students taking and not taking part in group physical activities (Independent samples t-test)

Logistic parameter	<i>Does not do group sports</i>			<i>Does group sports</i>			<i>t</i>	<i>p</i>	Cohen's <i>d</i>
	<i>N</i>	<i>M</i>	<i>SD</i>	<i>N</i>	<i>M</i>	<i>SD</i>			
<i>Anxiety total score</i>	33	6.303	3.468	46	4.913	3.663	1.716	0.045	0.388

Note. For the p-value and the t-value, the equal variances were not assumed, and the p-value was measured by doing a One-Sided test.

6 CONCLUSION

6.1 Purpose of the study and the main results

The purpose of this study was to examine the associations between anxiety and physical activity among university students studying in Finnish universities. Previous research has shown physical activity to be negatively correlated with anxiety symptoms (Hallgren et al. 2010), and some of the factors at play are believed to be the social relations and social support one can get by participating in physical activities (Laukkala & Kukkonen-Harjula 2019). I wanted to investigate the possible associations between anxiety symptoms and physical activity to see if there are any differences in the results based on how the physical activity is being implemented. The hypotheses for the study were, that students who report actively taking part in physical activities would report lower levels of anxiety than those who report taking part in physical activities more rarely. I also hypothesized that students reporting taking part in group physical activities would report lower levels of anxiety than those who reported not taking part in group physical activities, since I believed the social aspects of group physical activities would be a factor in reducing anxiety symptoms among the students.

The first hypothesis of this study was that the more the participants reported taking part in physical activity, the lower they would report their anxiety levels. Contrary to the hypothesis, the main results did not show statistically significant correlations between the amount of physical activity and the amount of anxiety symptoms among the students who participated in this study. It is difficult to know the specific reasons for the results, but one of my assumptions regarding the correlation-test is that the Godin leisure-time exercise-questionnaire was possible to interpret in different ways. When asked to fill out, how many times a week one does exercise for over 15 minutes, it could be possible to interpret e.g., three 1-hour long sessions as three times, or it could be possible to interpret it as twelve times (interpreting 1 hour as four 15-minute sessions). This may have skewed the results in a way which was not consistent. It is also possible that the relationship between physical activity and anxiety is more complex than previously assumed, possibly being influenced by other variables not included in this study. For

example, from the data gathered in this study, it is not possible to differentiate the motives for the participants' participation in physical activity. Even though Hallgren et al. (2010) have found that people who exercise regularly report lower levels of anxiety than those who do not, Corazza et al. (2019) have mentioned, that some people might feel an obligation to exercise, e.g., to modify their appearance. Therefore, exercise may feel like a task instead of an outlet for feeling better.

The second hypothesis was that the participants reporting taking part in organized sports would report lower levels of anxiety than those who did not. The second hypothesis was not met either, since there were no statistically significant differences between students who reported taking part in organized sports and those who reported not taking part in organized sports. The reason for this hypothesis was that people participating in organized sports would more likely engage in social interactions through the organized physical activities, therefore reducing the feelings of anxiety, since social relationships through physical activity may be a relevant factor for many to participate in physical activity (Laukkala & Kukkonen-Harjula, 2019). Possible reasons for the hypothesis not being met could be e.g., that people not participating in organized sports does not mean that the people would not engage in social relationships altogether. If a person does not participate in organized sports, they could still be physically and socially active on their free time, thus getting the same possible benefits of physical exercise.

The second hypothesis not being met, that participants participating in organized sports would report lower anxiety symptoms, could also be a result of different factors. One reason for it could be that the intensity, the type of exercise, and the individual perceptions of the person could be so influential, that just participating isn't enough of a factor to reduce anxiety. Since the participants who didn't participate in organized sports could still possibly participate in sports on their own, it could be possible for them to get the same benefits of exercise, even though the exercise one does is not organized by an outside party. No one in the study scored a 0 in regards of the physical activity score, meaning that everyone participated in at least some form of physical activity in their weekly life. If one did physical activity on their own time without organized physical activity sessions, it could perhaps be possible for one to get even more benefits from the physical activity, since this way, one could better influence the intensity and form of the physical activity in accordance with their own personal needs and perceptions.

This could not be investigated further or answered based on the data or findings of this study though.

The third hypothesis was that the participants participating in group sports would report lower levels of anxiety than those who do not. This hypothesis was met. The reason for this hypothesis was also that social relationships may be a relevant factor for some to participate in physical activity (Laukkala & Kukkonen-Harjula, 2019), and by participating in group sports, the participants get support for their wellbeing through the social relationships as well as getting the benefits of exercise. The social aspect has been found to be an important factor in promoting mental health (Staal & Jespersen 2015), while exercise alone has also been found to improve the well-being of people suffering from anxiety (Aguinaga 2018). Based on the results of this study, it could be theorized, that the combined effect of both of these factors could increase the possibilities of reduced anxiety.

6.2 Ethics and reliability

The study included 100 participants, so the results should not be generalized for the entire university student-population in Finland. The data for this study was collected via a web-questionnaire, which did not require any authorization or identification, so I can only trust that the people who participated in this study were being honest while responding to the questionnaire. There was an opportunity to attend a raffle for movie tickets after responding to the survey, and this information was provided before responding to the survey. Therefore, it could've been possible for someone to fill out the survey with the sole purpose to join the movie ticket raffle, even if they did not fit the target demographic. The survey was also shared on my personal Instagram-page, which means that most of the people attending this study were people I most likely personally know. This could've also resulted in people I know filling out the survey with the sole purpose of helping me out with my thesis, even if they did not fit the target demographic.

The web-questionnaire included the Godin leisure-time exercise-questionnaire in it, and it is possible that the participants interpreted the questions on it in different ways. For example, the

participants were required to write down, how many times per week they exercised in different intensities (strenuous, moderate, or light/mild) for more than 15 minutes. It could be possible for one to write down the amounts of times they did exercise that week for over 15 minutes at a time, or it could also be possible for one to interpret a 1-hour long exercise session as four 15-minute periods. Therefore, it must be considered that the measures in this study may vary due to issues interpreting the questionnaire in only one way, which in this case affects the reliability of the results.

I had my hypotheses for the results of this study, so I was expecting certain results while analyzing the data. I analyzed the data together with my thesis supervisor, which decreased the possibilities of me intentionally or unintentionally manipulating or interpreting the results in favor of my hypotheses. I would not get any personal gain from any kind of results, so I do not have any motives to provide certain results with this study either.

The GAD-7-anxiety scale has been found to be reliable and consistent in screening anxiety symptoms in university students. Tabia et al. (2021) conducted a study on Bangladeshi university students, which provided consistent results. Studies conducted in Portugal, USA, Iran, Peru, Germany, and Korea have also provided similar results, which shows good internal consistency of the GAD-7-scale across various populations. (Tabia et al. 2021)

6.3 Limitations of the study

As stated in the chapter above, the study concluded of 100 participants. The participants did not specify their occupation either. With this sample size and no knowledge of the occupations of the participants, the results should not be generalized for all university students in Finland. There was also only one person doing this study, with the help of a thesis supervisor, which can have possibly caused unnoticed biases while conducting the study. For example, the hypotheses while conducting the survey for this study could have influenced the way the survey was structured. There were two people reviewing the survey before it was published, lowering the possibility for biases. The survey was also conducted in English, even though the participants were university students studying in Finland, therefore most likely also speaking Finnish as

their first language. This may also have led to possible misunderstandings while filling out the survey.

6.4 Conclusions and future research

In the beginning of this study, the expectations for the results were that the study would support all three of the hypotheses, but only one of the hypotheses ended up being met. In this study, there were not found any statistically significant correlation between the amount of self-reported physical activity and self-reported anxiety symptoms among the participants. Any statistically significant differences between the participants who took part in organized sports and those who didn't weren't found either.

The only statistically significant result was that the participants taking part in group physical activities reported lower anxiety levels than the ones not participating in group physical activities. As previously stated, the social connections and support can be factors that influence the well-being of individuals participating in physical activity (Laukkala & Kukkonen-Harjula 2019), which is why it was hypothesized, that people participating in group sports would report lower anxiety levels. In the future, it could be beneficial and important to examine how participating in group physical activities influences anxiety symptoms in individuals. This could be done by e.g., conducting a larger study with a larger sample size. If there were more participants participating in different forms of group exercise, it could be possible to examine the differences between the groups by e.g., dividing the participants in different groups based on the sports they do. With the sample size of this study, it was not yet possible. It would also be beneficial to study the different factors, which the participants believe to influence their anxiety when participating in physical activity. By studying this topic further, it could be possible to provide different beneficial forms of physical activities, which would therefore help alleviate anxiety in the Finnish university student population.

In future research, it would also be important to make the instructions on questionnaires as clear as possible, minimizing the risk of the participants interpreting the questions in different ways. In this case, if using the Godin-questionnaire, clearly either instructing the participants to count

every 15 minutes as one session or counting every session lasting over 15 minutes as one single session, no matter the duration of it. This way the responses would be consistent with each other and more reliable when analyzed. It would also be beneficial to follow up a study like this with a follow up-study, to see, if the results stay similar to each other e.g., during different times of the year.

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