

ASSOCIATION BETWEEN PHYSICAL ACTIVITY AND PERCEIVED STRESS AMONG COLLEGE- AND UNIVERSITY STUDENTS

A quantitative study from a public health science perspective

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ABSTRACT

Background: Physical activity and perceived stress affect college- and university students health.

Aim: The aim is to study the association between physical activity and perceived stress among college- and university students in Sweden, and to investigate whether gender, age, and BMI are confounding factors regarding the association between physical activity and perceived stress.

Method: A cross-sectional online survey was conducted among the study population students. The analytical approaches chosen were descriptive analysis, Pearson's correlation coefficient, and multiple linear regression.

Results: According to the correlation analysis, there was a small negative significant association between physical activity and perceived stress. According to the regression analysis, there was a small negative significant association between physical activity and perceived stress, which remained after considering gender, age, and BMI.

Discussion: The association between high physical activity and low perceived stress can be explained by the protective impact physical activity has on health.

Conclusions: There was an association between physical activity and perceived stress among college- and university students. The association between physical activity and perceived stress among college- and university students remained after controlling for gender, age, and BMI.

Keywords: College- and university students, perceived stress, physical activity, public health sciences.

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1 INTRODUCTION

In March 2020, during the on-going degree project work, Sweden was affected by extensive societal changes due to the risk of the contagion COVID-19 virus. A recommendation was given to organize all university-level teaching to be conducted online. As major parts of the society were affected the Government gave regulations to avoid physical contact with other people to avoid spreading the infection. As a consequence, there were difficulties to collect data for the degree projects. Therefore, in this specific thesis, strengths and weaknesses with conducting an online questionnaire will be discussed.

Health is considered a fundamental human right. Health involves an individual's physical, social, and mental well-being, and it is not only the absence of disease. Health is a beneficial recourse enabling individuals to live a productive life. In order for individuals to develop good health, certain prerequisites are necessary. For example, peace, beneficial social and economic conditions, stable eco-system, and sustainable recourse use. By enabling access to basic resources for health, good individual and collective health can be achieved.

In Sweden, the health among the population is relatively good. Today, individuals often report their health as good. Although, there are health differences within and between social groups for instance within college- and university students. In the light of this, college- and university students health needs to be highlighted more from a Swedish perspective. Today, female university students in Sweden are less physically active and tend to report more perceived stress than male university students. Furthermore, the older students get, the less likely they are to spend time on leisure and transport physical activity. Additionally, younger students report more perceived stress in comparisons to older students. Furthermore, students with overweight often report an insufficient physical activity level, while stressful life events also are reported more by obese and extremely obese adults. Therefore, to study the association between physical activity and perceived stress may clarify if increased physical activity decreases the degree of perceived stress.

Previously, the author has studied psychosomatic symptoms and social support among students and it is now of interest to further study student's health. During the past year, physical activity and perceived stress have interested the author and by studying the association between these factors among students, a deeper understanding can emerge about both their health and in other public health topics. In addition, public health sciences are a scientific field that focus on creating prerequisites that will help people to develop as good health as possible. By studying the factors physical activity and perceived stress among students, there is a possibility to understand if physical activity interventions are needed in order to improve their perceived stress.

2 BACKGROUND

2.1 Physical activity

Physical activity is all bodily movement that activates the body and that requires energy expenditure (World Health organization [WHO], (2020a). There are multiple physical activities which an individual can engage in, for example, household chores, working out, traveling, and playing. Furthermore, physical activity generates multiple health benefits and the health status can be improved by following specific recommendations.

2.1.1 Benefits of physical activity

Physical activity is a determining factor for health development (WHO, 2020b) and is one of multiple factors that can enable healthy ageing (Petee Gabriel & Gay, 2012). Physical activity enables both bodily benefits and mental benefits. Firstly, physical activity results in better fitness and function (WHO, 2020a). Secondly, there are multiple health benefits if an individual engages in physical activity that is above the minimum recommended level for adults. A systematic review concluded that in those specific cases individuals have a lower risk for the diseases breast cancer, colon cancer, diabetes, ischemic heart disease, and ischemic stroke (Kyu et al., 2016).

2.1.2 General recommendations for physical activity

WHO (2020b) specifies three general recommendations regarding physical activity for the age group 18-64 years old. Adults should weekly perform either 150 minutes of activity that is known as moderate-intensity aerobic physical activity, or 75 minutes of activity that is known as vigorous-intensity aerobic physical activity. However, it is possible to weekly mix moderate- and vigorous-intensity activity and in that case an equivalent performance should be carried out (WHO, 2020b). Activities that are defined as moderate-intensity physical activity are dancing, gardening, and brisk walking. Activities that are defined as vigorous-intensity physical activity are aerobics, running, and fast cycling. The difference between moderate- and vigorous-intensity physical activity are the bodily effort. Moderate-intensity physical activity entails a bodily effort that is moderate, while vigorous-intensity physical activity entails a bodily effort that is large (WHO, 2020c). Secondly, a minimum of 10 minutes duration of aerobic activity is recommended. Additionally, adults should perform at least two days a week muscle-strengthening physical activity (WHO, 2020b).

2.1.3 Determinants of physical activity

The possibility to be physically active is affected by the individual's socio-economic resources and by multiple environmental factors. Health determinants, for example, the physical environment such as different work environments, the social environment such as social and

community networks, and the cultural environment have an impact on the individual health and will either generate health or ill health (Dahlgren & Whitehead, 2007; Folkhälsomyndigheten, 2020a). In the light of this, WHO (2020d) explains that physical activity levels could be increased by implementing population-based approaches.

2.2 Physical activity in Sweden

Changes within the Swedish society and a shift in individual's lifestyle habits have caused a lower degree of physical activity within the population (Folkhälsomyndigheten, 2020a). Today, for example, it is more common to have jobs that do not require much physical activity. It is also more common that walking and cycling trips are replaced with car trips. In addition, these are some lifestyle change that is occurring within both younger and older age groups. Furthermore, a Swedish population-based study among individuals between 16 to 84 years old, showed that many participants did perform weekly a minimum of 150 minutes of physical activity. However, that was not the case for some specific groups and the result showed that there is a social gradient regarding physical activity. Those who are physically active are often individuals who have a post-secondary education, while those who are less physically active often have a secondary education or pre-secondary education (Folkhälsomyndigheten, 2020a).

2.3 Stress and perceived stress

There are several definitions for the concept stress. One common definition is that stress is a reaction of an imbalance between an individual's demands and their specific coping capability (Danielsson et al., 2012). In extension, perceived stress is related to stress that is experienced during a specific time point. Perceived stress is a concept that has two dimensions. Firstly, it describes how an individual *feel* during stressful situations. Secondly, it describes how an individual *deal* with stressful situations. Furthermore, individuals handle situations differently and is often due to disparities among support systems, coping resources, and personalities (Phillips, 2013).

2.3.1 Stress and its effects

Stressful situations activate the biological stress management system (Danielsson et al., 2012) and it refers to the autonomic nervous system and the hypothalamic pituitary adrenal system (Wied & Jansen, 2002). The biological stress management system can be activated by, for example, sudden physical threats, or by mental and psychosocial stress. The difference between these stressors is that, the biological stress management system can be easier switched off when it is activated by sudden threats and physical exertion, than when activated by mental and psychosocial stress. If an individual undergoes any type of stress it is essential with rest because rest helps the body to recuperate properly (Danielsson et al., 2012).

Stress affects the body and an impact occurs regardless of sort of stress. Common sorts of stress are acute stress, sudden stress, prolonged stress, and chronic stress. Acute stress releases stress hormones (Danielsson et al., 2012), and those are adrenaline, noradrenaline, and cortisol (Lundberg, 2005). Stress hormones are released in order to mobilise energy and gives better focus and strength. Furthermore, this reaction increases the blood pressure, blood sugar and blood fat levels. The body is, for example, not as sensitive to pain and the blood's coagulation functionality improves. Sudden stress can result in preparation for physical exertion, *fight-or-flight*, and the individual will either fight the threat, or flee from the threat. In this state, the body can manage physical injuries and common feelings are fear, anger, aggressiveness, and irritation. Sudden stress can also result in preparation for *play-dead-response* and occurs if the individual cannot manage the threat. In this state, it is common that an individual experience tiredness and faintness (Danielsson et al., 2012).

Prolonged stress often leads to a bodily imbalance, and it particularly imbalances the degenerative and regenerative functions (Danielsson et al., 2012). In this state, the main task for the body is to mobilize energy and allowing the body to grow or heal is not prioritized. Prolonged stress weakens the immune system and the body becomes more vulnerable to pain. Prolonged stress increases the risk of developing cardiovascular diseases and diabetes. In this state, feelings such as depression and sadness can arise. Chronic stress affects the health, since it primarily results in pain. Chronic stress impairs the body's capability to move and occurs because the stress affects the functionality of the muscles. For example, this can give impaired muscle control and muscle stiffness, which can complicate daily life (Danielsson et al., 2012). Ultimately, there are determinants of perceived stress, which will be further highlighted in chapter 2.6.

2.4 Stress in Sweden

In Sweden, stress within the population has increased over time. In a population survey carried out in 2018, 16 percent of the study population reported that they felt stressed (Folkhälsomyndigheten, 2020b). In total, 19 percent of the participating women and 12 percent of the participating men reported that they felt stressed. Furthermore, individuals belonging to the age group 16-29 years old reported stress to a higher degree than individuals that were 30-44 years old, 45-64 years old, and 65-84 years old. One difference, for example, was that 26 percent within the youngest age group were stressed, whereas 5 percent within the oldest age group were stressed.

In addition, individuals born in Sweden or in other Nordic countries reported a lower degree of stress (Folkhälsomyndigheten, 2020b). The highest degree of stress was instead reported by individuals born in countries outside Europe or in the rest of Europe, and 18 percent respectively 19 percent were stressed. Additionally, a lower degree of stress was reported by those who had a secondary education level or a pre-secondary education level, and 11 percent respectively 13 percent were stressed. Furthermore, a higher degree of stress was reported by those who had a post-secondary education level and of those individual's 16 percent reported being stressed. Finally, individuals living in Stockholm County and Södermanland County

were more stressed in comparison to individuals living in Norrbotten County and Dalarna County.

2.5 Physical activity among college- and university students

Today, it is more common that female university students in Sweden are less physically active compared to male university students (Schmidt, 2012). It has also been revealed that university students who are overweight tend to report an insufficient physical activity level (Silva & Petroski, 2011). Moreover, female university students that have underweight or obese tend to report a lower degree of physical activity (Aceijas, Bello-Corassa, Waldhäusln, Lambert & Cassar, 2016). Studies have also examined the role of age and physical activity. A study showed that less time is spent on leisure and transport physical activity the older students get (Nowak, Bożek & Blukacz, 2019) and younger students tend to report more physical activity (Buckworth & Nigg, 2004).

Factors that is causing a lack of physical activity for students are, for example, academic work and lack of places for students to engage in physical activity (Elsawi Khalafalla et al., 2016). Additionally, embarrassment, lack of time, and lack of money are other common factors that hinder university students to be physically active (Aceijas et al., 2016).

2.6 Perceived stress among college- and university students

In a Swedish study based on 152 university students, female university students reported more perceived stress compared to male university students. Additionally, female university students to a higher degree than male university students reported a poorer overall health and mental health. Most of the university students had a normal weight and the participants body mass index (BMI) were between 20 to 25 (Schmidt, 2012). In another Swedish study based on 332 university students, female university students also reported more perceived stress than male university students. However, male university students were, for example, more overweight and obese, and were not as interested in receiving information about healthy habits (Von Bothmer & Fridlund, 2005).

There are factors that can cause perceived stress among college- and university students. For example, predictors of perceived stress are life satisfaction, optimism, and psychological distress (Saleh, Camart & Romo, 2017), and hidden factors for perceived stress are age, depression, and nervousness (Saeed, Bahnassy, Al-Hamdan, Almudhaibery & Alyahya, 2016). Specifically, younger students report higher perceived stress levels than older students (El Ansari, Oskrochi, Haghgoo & Tchounwou, 2014). Moreover, there is a lack of knowledge about whether BMI is a risk factor for perceived stress among college- and university students in Sweden. Although, stressful life events are reported more by obese and extremely obese adults than by adults that are normal weight (Barry & Petry, 2008). A longitudinal study based on Swedish students showed that, the consequences of experiencing stress hindered university students' ability to perform academically (Vaez & Laflamme, 2008).

2.7 Association between physical activity and perceived stress among college- and university students

Previously, physical activity and perceived stress among college- and university students have been studied. A systematic review revealed there is an association between physical activity and perceived stress. The result showed that individuals that followed the guidelines concerning vigorous intensity physical activity had lower risk of perceived stress (Dogra et al., 2018). Similar results have also been highlighted in an American study based on 14 804 undergraduate students after ruling out the effect of response rate, meeting vigorous physical activity recommendations in high school, sex, age, weight status (underweight, normal overweight, obesity, class II obesity), race, ethnicity, socioeconomic position, year in school, and socializing (Vankim & Nelson, 2013). In addition, reporting sufficient physical activity entailed a lower risk for perceived stress among college students from China, after adjusting for age, BMI, nationality, mothers' educational level, usage of tobacco, alcohol, and sleep quality (Zhai et al., 2020). However, one study consisting of 74 students showed that there is not an association between physical activity and perceived stress among college students (Hubbs, Doyle, Bowden & Doyle, 2012).

The model of health determinants (figure 1) can be of use in this study in order to help explain potential reasons for the association between physical activity and perceived stress. The model describes how the health status is influenced by different interlinking layers, which can either prevent ill health or promote health. An individual's age, gender, and characteristics are the center point of the model and are predetermined. In the first layer, individual lifestyle factors, for example, physical activity or diet can either damage or enhance health (Dahlgren & Whitehead, 2007). It is known that, for example, exercise can improve perceived stress and quality of life. Exercise can also lower stress hormones caused by psychological stressors (Stults-Kolehmainen & Sinha, 2014).

In the second layer, social and community networks, for example, family and friends, can further affect and influence an individual's health status. The third layer describes the impact of living and working conditions such as work, education, and health care services. The fourth layer highlights how a countries general socio-economic, cultural, and environmental conditions influence an individual's health status (Dahlgren & Whitehead, 2007). The model can help deepen the understanding of how these multiple factors and layers of the model can affect the health among college- and university students. The benefits are that, it can explain the influence of physical activity on perceived stress and show a wider perspective of other possible factors that can affect college- and university students perceived stress.

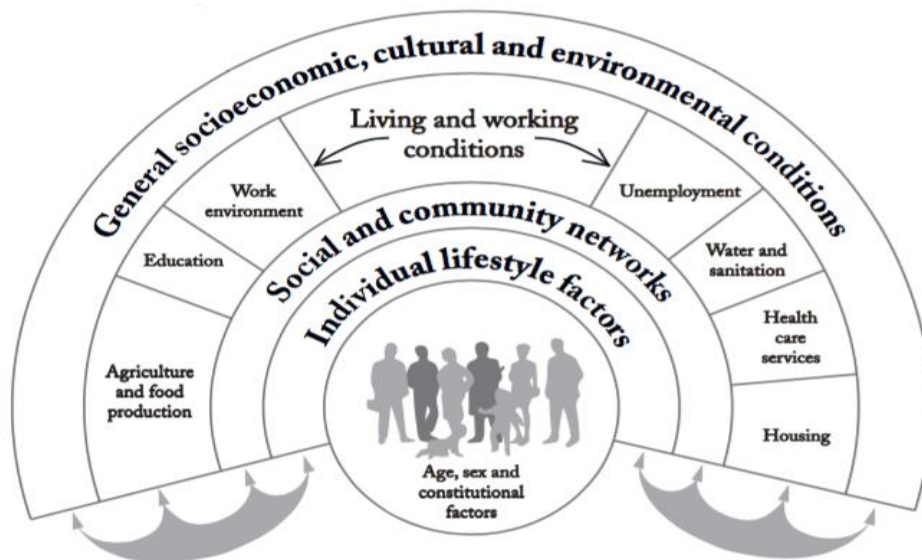


Figure 1: The model of health determinates.
Obtained from Dahlgren & Whitehead, 2007.

2.8 Relevance of the topic to public health sciences

Public health sciences are a scientific field that intends to improve quality of life within population groups (WHO, 1998). Public health sciences focus on preventing ill-health and promoting health by implementing population-based interventions, which are intended to preserve and extend life. By studying health determinants, for example, health behaviors, lifestyle choices, and living conditions, an understanding can emerge on how to improve quality of life (WHO, 1998).

This study focuses on college- and university students physical activity level and perceived stress. Physical activity is a factor that has an impact on health (WHO, 2020b) and engaging in physical activity generates bodily benefits and mental benefits (WHO, 2020a). Furthermore, it is less common for individuals and groups that are physically active to develop diseases (WHO, 2020b). Currently in Sweden, there is a variation in the degree of physical activity within different social groups (Folkhälsomyndigheten, 2020a). It is also common to report stress (Folkhälsomyndigheten, 2020b) and studies have shown that stress is specifically reported among college- and university students (Folkhälsomyndigheten, 2020c). By furthermore investigating the association between physical activity and perceived stress, it can clarify needs within college- and university students. This, in turn, can enable a possibility to create situation-based interventions that can improve students' quality of life. Thus, the topic of the study is particularly well-known within the public health scientific field.

2.9 Problem formulation

By studying the association between college- and university students' physical activity and perceived stress, their health status can be highlighted. Previously, Swedish studies have chosen to focus on the factors gender, age, and BMI in relation to physical activity and perceived stress among university students (Schmidt, 2012; Von Bothmer & Fridlund, 2005). However, these studies were conducted a couple of years ago which highlights a need to investigate the association between physical activity and perceived stress. This, in turn, may clarify if increased physical activity entails decreased perceived stress among college- and university students. If this is shown in the study, it is possible to create prerequisites for increased physical activity which may help students to deal with their perceived stress. In addition, it is unclear whether the association between physical activity and perceived stress remains after ruling out the unique effect of gender, age, and BMI. By particularly studying different aspect of the association between physical activity and perceived stress among college- and university students, up-to-date knowledge can emerge about this public health topic.

3 AIM

The aim is to study the association between physical activity and perceived stress among college- and university students in Sweden, and to investigate whether gender, age, and BMI are confounding factors regarding the association between physical activity and perceived stress.

3.1 STUDY QUESTIONS

1. Is there an association between physical activity and perceived stress among college- and university students?
2. Is there an association between physical activity and perceived stress among college- and university students after controlling for gender, age and BMI?

4 METHODS AND MATERIAL

4.1 Methodological approach

A quantitative methodological approach was used in this study. Quantitative method aims to study, for example, the prevalence of a phenomenon, differences between and within groups, and relationships among phenomenon. In order to measure a phenomenon, it is common to firstly use appropriate instruments and secondly apply statistical procedures (Creswell & Creswell, 2018). The scientific approach within quantitative method is positivism and phenomenon are described by using reason and rational thought. Clarifying that, researchers want to observe and measure phenomenon. Researchers aims to apply an objective approach and consequentially this may hinder emotional and personal bias (Bruce, Pope & Stanistreet, 2018).

The related scientific theory approach for quantitative method is deduction. Deduction is a scientific reasoning where the researcher beforehand presents a hypothesis and then later on test this hypothesis. Hypothesis is an assumption describing the result that the researcher believes is going to be revealed. In addition, the researcher can then compare the hypothesis with the results and then either discard or redefined the hypothesis (Bruce et al., 2018). Furthermore, a qualitative methodological approach distinguishes from a quantitative methodological approach, since it focuses on understanding the phenomenon in-depth rather than testing and measuring reality (Creswell & Creswell, 2018).

The present study focuses on examining the association between physical activity and perceived stress among college- and university students. Within quantitative studies it is common to particularly study the association between phenomenon (Creswell & Creswell, 2018). In the light of this, a quantitative methodological approach was necessary and enabled a possibility to investigate the aim of the study.

4.2 Study design

A cross-sectional survey was carried out in regard to the present study. Cross-sectional surveys are performed in order to understand public health problems and are often conducted at a single occasion. They are frequently carried out during a short period of time without a follow up period and are applicable for the purpose of examining associations. Furthermore, there are both strengths and weaknesses with cross-sectional surveys. Strengths are that, cross-sectional surveys often are inexpensive, useful if time is limited, and researchers may have the possibility to study several associations at once. Weaknesses are that, an understanding about if a variable preceded or followed another variable cannot be highlighted, hence cross-sectional surveys cannot clarify the causal direction of an association. Another weakness is that cross-sectional surveys have a risk for response bias.

Response bias means that there is a systematic difference between study participants and non-study participants (Merrill, 2013).

4.3 Sample

Within quantitative studies the aim is to understand phenomena in regard to a certain population (Field, 2018). In the present study, the study population was college- and university students in Sweden. When conducting a quantitative study, a researcher can use different sampling methods. The most favorable sampling method to use is a random sampling. Random sampling allows an equal chance of participants to be include in a study. However, this sampling method is not always feasible to carry out and requires a demanding procedure (Creswell & Creswell, 2018). In some cases, a snowball sampling is carried out. A snowball sampling procedure allows researchers to find participants by using their specific networks and contacts. A benefit with snowball sampling is that it can make it possible for researchers to find participants who fulfill the selection criteria for participation. This, in turn, can make it feasible to perform certain studies (Bruce et al., 2018). Furthermore, a snowball sampling was carried out. The author specifically used her networks and contacts in order to easily reach college- and university students.

4.3.1 Sample size determination

A sample size determination focuses on how many participants a study should include and ideally a large sample is aimed for. However, large samples may be hard to reach since it is often time consuming and expensive. There are various approaches to determine the sample size needed in a study, for example, to investigate the sample size used in similar studies, to do a power analysis (Creswell & Creswell, 2018) or to consider specific guidelines (Field, 2009). One guideline to consider when conducting a regression analysis is to add the number of independent variables with the number 104, which then represents the total sample size needed (Field, 2009). In the present study, this meant that the sample should at least consist of 108 participants, since the variables physical activity, gender, age, and BMI together with the number 104 was 108. Finally, this guideline was used in order to understand the minimum sample size needed in order to conduct the study.

4.4 Data collection

4.4.1 Variables

When conducting a quantitative study there are multiple variables to consider and those are independent variables, dependent variables, and in some studies also confounding variables. A variable that influence or affect another variable are defined as an independent variable. A variable that depend on independent variables are defined as a dependent variable and can

further be described as the expected outcome or result (Creswell & Creswell, 2018). Confounding variables are variables that may affect the association between an independent variable and a dependent variable. In order for a variable to be considered a confounding variable, it has to be associated with the independent variable, be classified as a risk factor for the specific dependent variable, and it shall not stand between the independent variable and the dependent variable, hence it shall not be in the causal pathway. Furthermore, by controlling for confounding variables, clarity can emerge regarding the actual association between variables, since the effect of other variables is taken into consideration (Bruce et al., 2018).

First, the association between the independent variable physical activity and the dependent variable perceived stress was studied, without assuming a direction. Second, it was of interest to examine the hypothesis that physical activity predicts perceived stress independently of gender, age, and BMI – thus, assuming a direction (figure 2).

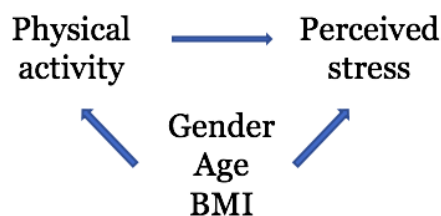


Figure 2: A framework demonstrating the interrelationships between the variables used in the study.

4.4.2 Questionnaire

In order to investigate the aim of the study, a questionnaire was created. The questionnaire consisted of ten main questions. Questions one to nine did not have any sub questions, while question number ten had 12 sub questions. The questions one to six measured different background variables, questions seven to nine measured physical activity, and question number ten measured perceived stress (Appendix D).

The background variables that were measured were the students' college or university, gender, age, height, weight, and general state of health. The questions that were used were: *which college or university do you study at?*, *how do you define your gender identity?*, *how old are you?*, *how tall are you?*, *how much do you weigh?* and *how do you assess your general state of health?*. All of these questions had open response alternatives except when filling in gender and general state of health. The answer alternatives for the question about gender were: *female*, *male*, *other*, and *I don't know*. The answer alternatives for the question about general state of health were: *very good*, *good*, *fair*, *poor*, and *very poor* (Appendix D). The questions regarding students' college or university and age were formulated by the author. The other questions were obtained from the Swedish national public health survey health on equal terms 2020. It is a survey that measures the health among the Swedish population (Folkhälsomyndigheten, 2020d).

Physical activity was measured by asking about college- and university students

physical exercise, everyday activities, sedentary behavior, and if they are interested in increasing their physical activity. The question that measured physical exercise was: *How much time do you spend on a regular week on physical exercise that makes you breathless, such as running, gymnastics or ball sports?*. The answer alternatives were: *0 minutes/no time, less than 30 minutes, 30-59 minutes (0.5-1 hour), 60-89 minutes (1-1.5 hours), 90-119 minutes (1.5-2 hours), and 2 hours or more*. The question that measured everyday activities was: *How much time do you spend on a regular week on everyday activities, such as walking, biking or gardening? Count all the time (at least 10 minutes at a time)*. The answer alternatives were: *0 minutes/no time, less than 30 minutes, 30-59 minutes (0.5-1 hour), 60-89 minutes (1-1.5 hours), 90-149 minutes (1.5-2.5 hours), 150-299 minutes (2.5-5 hours), and 5 hours or more* (Appendix D).

Additionally, the question that measured college- and university sedentary behavior was: *How much do you sit during a normal day if you count off sleep?*. The answer alternatives were: *more than 15 hours, 13-15 hours, 10-12 hours, 7-9 hours, 4-6 hours, 1-3 hours, and never*. Finally, college- and university students were asked: *Do you want to increase your physical activity?*. The answer alternatives were: *yes, and I think I can do it myself, yes, but I need support, and no* (Appendix D). Furthermore, the questions about college- and university students physical exercise, everyday activities, and sedentary behavior were obtained from the Swedish national public health survey health on equal terms 2020. In addition, the question about if they are interested in increasing their physical activity were obtain from the Swedish national public health survey health on equal terms 2014 (Folkhälsomyndigheten, 2020d; Folkhälsomyndigheten, 2014).

Perceived stress was measured by using 12 out of 14 questions from the Swedish version of perceived stress scale. The Swedish version of perceived stress scale was translated by Mehmet Eskin and Deirdre Parr (Eskin & Parr, 1996) and after being in contact with one of the authors, permission to use the scale was obtained. Furthermore, Sheldon Cohen, Tom Kamarck, and Robin Mermelstein founded the perceived stress scale. The perceived stress scale aims to measure different specific stressful situations experienced during the past month, for example, situations that make life feel unpredictable, uncontrollable, and overloading (Eskin & Parr, 1996).

The questions included were: *been upset because of something that happened unexpectedly?, felt that you were unable to control the important things in your life?, felt nervous and stressed?, dealt successfully with irritating life hassles?, felt that you were effectively coping with important changes that were occurring in your life?, felt confident about your ability to handle your personal problems?, felt that things were going your way?, found that you could not cope with all the things that you had to do?, been able to control irritations in your life?, felt that you were on top of things, found yourself thinking about things that you have to accomplish? and been able to control the way you spend your time?*. Additionally, the answer alternatives were: *never, rarely, sometimes, quite often, and very often* (Appendix D). The questions that were excluded were: *how often have you been angered because of things that happened that were outside your control? and how often have you felt difficulties were piling up so high that you could not overcome them?*. These

two questions were excluded because they may be perceived as particularly sensitive in comparison to the other questions.

4.4.3 Data gathering

The questionnaire (Appendix D) was carried out by publishing it on Google Forms during the spring of 2020 and the data collection continued for eight days. Furthermore, a link to the questionnaire on Google Forms was published on the authors Facebook page and this announcement was later re-shared by friends and by a family member. A few days later, the announcement was also re-shared by some of the authors classmates. In addition, a link to the questionnaire on Google Forms was shared on Facebook groups. The questionnaire was published on multiple forums in order to reach as many college- and university students as possible. This, in turn, demonstrates that a snowball sampling was conducted, since the author used her networks and contacts in order to collect data.

Gathering data through an online questionnaire was not the author's first data collection strategy. The author wanted to distribute questionnaires at Mälardalen University. However, during the spring of 2020, the disease Covid-19 was spreading and causing deaths in Sweden (Folkhälsomyndigheten, 2020e). Furthermore, an online questionnaire was then necessary to be carried out. In addition, there are advantages and disadvantages with online questionnaires. Advantages are that online questionnaires can reach a number of participants quickly and are often not expensive. Disadvantages are that online questionnaires can be perceived as impersonal and can result in a low response rate (Evans & Mathur, 2005).

4.4.4 Handling of data and processing of data

The data was handled in multiple programs and processed in multiple steps. Firstly, the data was transformed from Google Forms to Excel. Secondly, the questionnaire was transformed from Excel to a statistical program called Statistical Package for Social Sciences (SPSS, version 24). The reason for first transferring the data from Google Forms to Excel was because it was not possible to transform the data from Google Forms to SPSS. Finally, in SPSS survey questions with answer alternatives were coded before SPSS was used to perform statistical analysis. As previously mention the questions about physical exercise and everyday activities (Appendix D) were obtained from the Swedish national public health survey health on equal terms 2020 (Folkhälsomyndigheten, 2020d). The questions can be merged in order to produce a combined measure for activity minutes. Furthermore, the middle value for each answer alternative represents the time spent on physical exercise and everyday activities. In addition, 120 minutes is the highest middle value for physical exercise, while 300 minutes is the highest middle value for everyday activities (Folkhälsomyndigheten, 2018). Therefore, all answer alternatives for the question about physical exercise (Appendix D) were recoded with the respective middle value (table 1). All answer alternatives for the question about everyday activities (Appendix D) were also recoded with the respective middle value (table 2). In addition, a new variable representing activity minutes was computed as: $\text{physical exercise} * 2 + \text{everyday activities} = \text{activity minutes}$, which is how the questions can be combined

(Folkhälsomyndigheten, 2018). A continuous variable was created representing both an index and activity minutes for physical exercise and everyday activities. A continuous variable is defined as data that spreads on a scale and often represent scores on the scale (Field, 2018).

Table 1: Recoding of each original answer alternative for question 7a to respective middle value.

7a) How much time do you spend on a regular week on physical exercise that makes you breathless, such as running, gymnastics or ball sports?	Original answer alternative	Recoded value
	0 minutes / no time	0
	Less than 30 minutes	15
	30-59 minutes (0.5-1 hour)	45
	60-89 minutes (1-1.5 hours)	75
	90-119 minutes (1.5-2 hours)	105
	2 hours or more	120

Table 2: Recoding of each original answer alternative for question 7b to respective middle value.

7b) How much time do you spend on a regular week on everyday activities, such as walking, biking or gardening?	Original answer alternative	Recoded value
	0 minutes / no time	0
	Less than 30 minutes	15
	30-59 minutes (0.5-1 hour)	45
	60-89 minutes (1-1.5 hours)	75
	90-149 minutes (1.5-2.5 hours)	120
	150-299 minutes (2.5-5 hours)	225
	5 hours or more	300

In the analyse phase, the questions four, five, six, seven, nine, ten, and thirteen from the Swedish version of perceived stress scale needs to be reversed (Eskin & Parr, 1996). Thereby, all of the questions are phrased the same way. Reversing questions are necessary in order to

avoid opposite responses and in practice, it is the answer alternatives that are recoded (Field, 2009). In the present study, the original answer alternatives for the previous mentioned questions were recoded into new values, hence the answer alternatives zero, one, two, three, and four were respectively recorded in to four, three, two, one, and zero. In addition, a continuous variable was created by computing all of the used questions in to an index. Originally, the Swedish version of perceived stress scale ranges from 0-56 (Eskin & Parr, 1996). However, in the present study, only 12 questions were used meaning that the scale ranged from 0-48. The lower the score, the lower degree of stress was reported and the higher the score, the higher degree of stress was reported.

In addition, a Cronbach Alpha test was performed of the index perceived stress. A Cronbach Alpha value demonstrates the internal consistency of a scale. That is, the degree to which questions on a scale measure the underlying construct and whether the questions correlate or not. Evidentially, the higher the Cronbach alpha value a scale has, the better the questions correlate. A Cronbach alpha value can fluctuate from 0 to 1 and optimal values fluctuate from 0.70 and 0.90. Furthermore, modifying a scale can affect its original Cronbach alpha value. Therefore, it is necessary to examine a scales Cronbach alpha value (Creswell & Creswell, 2018). In the present study, the index perceived stress had a Cronbach alpha value within the considered optimal values since the value was 0.853.

Lastly, the background variables length and height were recoded into a new variable and represented college- and university students BMI. BMI was computed by dividing a participant's weight with the participant's height (kg/m^2). In addition, there are different BMI classifications for adults and those are underweight (below 18.5), normal weight (18.5–24.9), pre-obesity (25.0–29.9), obesity class I (30.0–34.9), obesity class II (35.0–39.9), and obesity class III (above 40) (WHO, 2020e).

When conducting a questionnaire, it is common to have missing data. Missing data can, for example, occur if participants miss questions or do not want to answer specific questions (Field, 2009). In the present study, the missing values that occurred are presented in the result section and for each question it concerns.

4.5 Methods of analysis

First, the sample was described by performing descriptive analysis. Descriptive statistics provide information about the sample and summarizes the data, which makes it possible to describe the occurrence of phenomenon (Merrill, 2013). Descriptive analysis was carried out of the variable's college- and university students, gender identity, age, BMI, general state of health, the index physical activity, the variables physical exercise, everyday activity, sedentary behavior, increased physical activity, and of the index perceived stress. Furthermore, descriptive analysis allows the researcher to describe the results (Creswell & Creswell, 2018). By therefore demonstrating these results in frequency tables, it is possible to highlight the results clearly.

Before examining the two study questions, the risk of having outliers in the data was investigated. Outliers deviate from the overall pattern of values. Outliers can occur, for example, when values are unusual, incorrectly measured, or incorrectly recorded (Bruce et al., 2018). In the data two outliers were found and were unusual values. The first observed outlier found was in relation to the reporting of gender identity, while the second observed outlier found was in relation to the reporting of age. Consequently, the outliers were eliminated in order to not bias the results.

In order to answer the first study question: *Is there an association between physical activity and perceived stress among college- and university students?*, a correlation analysis was conducted by using Person's correlation coefficient. Pearson's correlation coefficient (r) can be applied when the purpose is to study associations, which can be carried out by using two continuous variables. The associations effect (strength) can be of different types. For example, it can have a small effect, a medium effect or a large effect which respectively has a r of $\pm 0.10-0.29$, $\pm 0.30-0.49$, and $\geq \pm 0.50$. Furthermore, different associations can emerge, for example, a negative association (-1), a positive association ($+1$), and a non-association (0). An association that emerges when an observed variable increases and simultaneously the other observed variable decreases is defined as a negative association (Field, 2018). In the present study, a negative association would mean that the more physically active the students were, the less stressed they were. An association that emerges when an observed variable increases and simultaneously the other observed variable increases is defined as a positive association (Field, 2018). In addition, a positive association would mean that the more physically active the students were, the more stressed they were. A non-association simply means that variables do not demonstrate a direction because, for example, one observed variable does not relate to another observed variable, hence there is a non-association (Field, 2018). In the present study, a non-association would mean that there was no association between physical active and perceived stress among students.

A correlation analysis carried out by using Person's correlation coefficient rely on data that is normally distributed (Creswell & Creswell, 2018). Normal distribution befalls when scores are placed in the centre of the distribution and a bell-shaped curve occurs. Other common data distributions are lack of symmetry (skew) and pointiness (kurtosis). Skew distributions occur when multiple scores are placed on one end of the scale, while kurtosis distributions occur when scores appear on the tails of the scale. In addition, values that represent a normal distribution is 0 for both skew and kurtosis (Field, 2018). However, values ranging from -2 and $+2$ are considered tolerable (George & Mallery, 2010).

In order to study the association between physical activity and perceived stress, the index physical activity and the index perceived stress was used. Before analysing the association between physical activity and perceived stress, the normal distribution for respective index was overseen. The index physical activity had a skew value of -0.123 and a kurtosis value of -0.898 . The index perceived stress had a skew value of -0.142 and a kurtosis value of 0.337 . Therefore, it was appropriate to carry out a correlation analysis by using Person's correlation coefficient. Evidentially, the indexes were continuous variables which correspondingly made it appropriate to carry out this specific correlation analysis. Moreover, the intention was to

study the association between physical activity and perceived stress without assuming a direction, which required a correlation analysis.

In order to answer the second study question: *Is there an association between physical activity and perceived stress among college- and university students after controlling for gender, age and BMI?*, a multiple linear regression was performed. Multiple linear regression is useful to apply when the relationship between variables is aimed to be understood, hence the interrelationship between a continuous dependent variable and multiple independent variables. Multiple linear regression intends to reveal independent associations of a risk factor in relation to a dependent variable by controlling for potential confounding factors. An advantage with using a multiple linear regression is that complex relationships can be revealed, and a deeper understanding can emerge about the potential relationship between a dependent variable and multiple independent variables (Bruce et al., 2018). In addition, linear models require an important condition which is that variables should be normally distributed (Field, 2018).

Furthermore, a multiple linear regression was performed by using the index physical activity, the index perceived stress, the variables gender, age, and BMI. As mentioned earlier, the index physical activity and the index perceived stress had acceptable skewness and kurtosis values. In addition, the variable age had a skew value of 3.314 and a kurtosis value of 0.236, which almost demonstrates acceptable values for normal distribution. In addition, the variable BMI had a skew value of 1.164 and a kurtosis value of 1.878, which demonstrates acceptable values for normal distribution. Moreover, it was of interest to examine the hypothesis that physical activity predicts perceived stress independently of gender, age, and BMI – thus, assuming a direction and studying the interrelationship among variables. Consequently, this required a multiple linear regression.

As the multiple linear regression was performed, a hierarchical regression procedure was conducted. Hierarchical regression is performed in a stepwise procedure by considering the order independent variables are included into the model (Field, 2018). A hierarchical regression was performed by in step one including the index perceived stress and the index physical activity, and by in step two including the variables gender, age, and BMI. Finally, the result was highlighted in a table.

Furthermore, a significance level is selected when performing analyses. The significant level determines the lowest acceptable level for rejecting the null hypothesis (*for example there is no association*) and for accepting the alternative hypothesis (*for example there is an association*). It is common to use a significant level of $p \leq 0.05$, which means that there, at most, is a 5 percent risk of drawing a conclusion that is incorrect. However, this significant level is as any other significant level arbitrary (Bruce et al., 2018). In the present study, the significant level was set at $p \leq 0.05$ when conducting the correlation analysis and the multiple linear regression. Finally, as mentioned earlier, SPSS was used in order to perform the statistical analysis.

4.6 Quality criteria

Quality criteria to consider when conducting a quantitative research are validity, reliability, and generalizability (Creswell & Creswell, 2018). *Validity* concerns whether a test, scale, or question measures what it is supposed to measure. It is about the accuracy of a test, scale, or question to measure a specific phenomenon (Bruce et al., 2018). Furthermore, it has been stated that the questions about physical exercise, everyday activity, and the question about sedentary behavior (Appendix D) have been validated (Folkhälsomyndigheten, 2018). When the questions about physical exercise and everyday activity were evaluated, fixed answer alternatives had stronger validity than open answer alternatives (Olsson, Ekblom, Andersson, Börjesson & Kallings, 2016). Additionally, validity can be of different sort and can, for example, include construct validity (Bruce et al., 2018) and external validity (Creswell & Creswell, 2018). *Construct validity* concerns the degree of which a scale measures the underlying concept it is intended to study (Bruce et al., 2018). In addition, adequate construct validity has been shown of the Swedish version of perceived stress scale (Eskin & Parr, 1996). However, since two questions from the scale was excluded the construct validity in regard to the degree that the index perceived stress measures perceived stress is violated. *External validity* is about the possibility to apply and generalize the finding from a study to similar populations (Creswell & Creswell, 2018).

Reliability concerns how well a measurement functions and produces reliable results over time, and moreover concerns a measurements repeatability (Merrill, 2013). An aspect of reliability is a scales *internal consistency*, which concerns the degree to which questions on a scale correlate and measure the underlying construct (Creswell & Creswell, 2018). As previously mentioned, the index perceived stress had a Cronbach alpha value of 0.853. A Cronbach alpha value that is optimal fluctuate from 0.70 and 0.90 (Creswell & Creswell, 2018). A second aspect of reliability is *stability*, which concerns whether it is possible to test measuring instruments across time. Stability provides an opportunity to examine if the same results can appear by using the same instrument (Bannigan & Watson, 2009). The present study was not carried out on a later occasion than the spring of 2020, which means that this criterion was not considered.

Generalizability is about to whom other than those who were studied that a result can be applicable to. In order for this to be possible, the group that was studied needs to have similar characteristics as the group that the findings are generalized to. Evidentially, generalizability highlights the same quality aspect as *external validity* (Creswell & Creswell, 2018). Furthermore, the possibility to generalize the findings to the study population college- and university students was limited. The choice of conducting a snowball sampling have limited the possibility of reaching a representative sample that highlights students' actual characteristics.

4.7 Research ethics

Scientific research has an important social function. Scientific research makes it possible to study new and old phenomena, which can improve people's health and living conditions. Researchers need to take in to account research ethical principles since it can preserve the importance of research and protect study participants. In Sweden, and in particular in the field of humanities and social sciences, the following ethical principles are followed: the information requirement, the consent requirement, the confidentiality requirement, and the utilization requirement (Vetenskapsrådet, 2002).

The information requirement is about presenting the purpose and research steps of the study, while also clarifying what role study participants have. By further clarifying participant's rights, which is that participation is voluntary and can be canceled, participants are granted the information they are entitled to (Vetenskapsrådet, 2002). The missive letter (Appendix C) that followed the questionnaire clarified the purpose of the study and described what research steps that particularly involved the participants. It was explained how the result was going to be presented and what the study was going to be used for. The result would not expose any particular participant and it was stated that all material would only be used in this study. Information regarding their participation was stated, for example, that it was voluntary to participate and that they could discontinue their participation if they would like to.

The consent requirement emphasizes that all participants control and decides over their participation, and that it is vital to obtain participants consents. Furthermore, a participant has the right to discontinue their participation and shall not be penalized if such a decision is made (Vetenskapsrådet, 2002). In the missive letter (Appendix C) it was clarified that all participants themselves decided over their participation. Furthermore, it was stated that pressing *send* means that a participant digitally gives their consent.

The confidentiality requirement is about securing information about participants. It is about providing as much confidentiality as possible. It also requires that results should be reported in a way that does not reveal participants, since this may harm them (Vetenskapsrådet, 2002). In order to secure the information given by the participants, the researcher had a password-protected account on Google and a password-protected computer. Furthermore, this was done for the purpose of providing as much confidentiality as possible. In order to not expose any participant, the result was presented by using the concept college- and university students. When conducting studies, it is also important to grant participants anonymity (Creswell & Creswell, 2018). In order to grant the participants anonymity, the questionnaire on Google Forms was reviewed at certain times during the data gathering process. This, in turn, was done in order to not identify participants that may have filled in the questionnaire after seeing a certain publication about it.

The utilization requirement clarifies that researchers do not have the right to use information about participants for purposes other than research. This, in turn, can protect participants from being exposed (Vetenskapsrådet, 2002). Finally, the missive letter (Appendix C)

clarified that all material would only be used in order to investigate the aim of the study and not for other purposes.

5 RESULTS

5.1 Sample

The sample consisted of 110 college- and university students after excluding one participant that did not study at a college or university. The students studied at 20 different colleges and universities in Sweden. The majority of the students studied at Mälardalen University (43.4%) followed by Linköpings university (21.7%). A predominant amount of the students were female students (70.9%). In addition, the majority of the students reported that their general state of health was good (50.0%). The mean age among college- and university students was 23.87 (SD 4.10), while the mean BMI was 23.82 kg/m² (SD 3.71 kg/m²) which indicates a normal weight (table 3).

Table 3: Descriptive statistics of background variables.

Background variables	n	%
College- and university		
Mälardalens University	46	43.4
Linköpings University	23	21.7
Other colleges- and universities	37	34.9
Missing	4	
Gender identity		
Female	78	70.9
Male	31	28.2
Other	1	0.9
I don't know	0	0
Missing	0	
General state of health		
Very good	34	30.9
Good	55	50.0
Fair	19	17.3
Poor	2	1.8
Very poor	0	0
Missing	0	

Background variables	Range	M ± SD
Age^a	19-49	23.87±4.10
<i>Missing</i>	5	
BMI^b	17.63-37.98	23.82±3.71
<i>Missing</i>	2	

M=Mean. SD=Standard deviation. BMI = Body mass index (kg/m²). Missing values not included in the percentage distribution.

n_a= 105. n_b= 108.

It was more common that students during a week spent two hours or more on physical exercise (40.0%), whereas a majority spent one hour or more on everyday activities (72.4%). There was a spread in sedentary behavior among the students and it was slightly more common to sit seven to nine hours during a normal day (33.6%). Furthermore, a majority of the students wanted to increase their physical activity and they thought that it could be improved by themselves (62.4%). During a week, college- and university students performed physical activity from 15 activity minutes to 540 activity minutes (288.30±144.67). In addition, college- and university students reported their perceived stress on a scale from 0 to 41 (21.73±7.44) (table 4).

Table 4: Descriptive statistics of the variables physical exercise, everyday activity, sedentary behavior, increased physical activity, the index physical activity, and the index perceived stress.

Physical activity	n	%
Physical exercise		
0 minutes / no time	9	8.2
Less than 30 minutes	12	10.9
30-59 minutes (0.5-1 hour)	21	19.1
60-89 minutes (1-1.5 hours)	12	10.9
90-119 minutes (1.5-2 hours)	12	10.9
2 hours or more	44	40.0
<i>Missing</i>	0	
Everyday activity		
0 minutes / no time	1	0.9
Less than 30 minutes	10	9.2
30-59 minutes (0.5-1 hour)	18	16.5
60-89 minutes (1-1.5 hours)	18	16.5
90-149 minutes (1.5-2.5 hours)	26	23.9
150-299 minutes (2.5-5 hours)	23	21.1
5 hours or more	13	11.9
<i>Missing</i>	1	

Sedentary behavior

More than 15 hours	1	0.9
13-15 hours	10	9.1
10-12 hours	21	19.1
7-9 hours	37	33.6
4-6 hours	34	30.9
1-3 hours	5	4.5
Never	1	0.9
<i>Missing</i>	<i>0</i>	

Increased physical activity

Yes, and I think I can do it myself	68	62.4
Yes, but I need support	20	18.3
No	21	19.3
<i>Missing</i>	<i>1</i>	

Index Physical activity	Range	M ± SD
Activity minutes_c	15-540	288.30±144.67
<i>Missing</i>	<i>1</i>	
Index perceived stress	Range	M ± SD
Perceived stress_c	0-41	21.73±7.44
<i>Missing</i>	<i>3</i>	

M=Mean. SD=Standard deviation. Missing values not included in the percentage distribution.
n_c=109.

5.2 Association between physical activity and perceived stress among college- and university students

There was a small negative association between physical activity and perceived stress among college- and university students ($r=-0.192$). This implied that the more physically active the students were, the less stressed they were. The association between physical activity and perceived stress was statistically significant ($p=0.050$).

5.3 Association between physical activity and perceived stress among college- and university students after controlling for gender, age and BMI

In the first step of the multiple linear regression, physical activity accounted for 3.9% of the variation in perceived stress (Adjusted $R^2=0.039$). In the second step of the multiple linear regression, when taking in to account physical activity, gender, age, and BMI, these predictors accounted for 6.4% of the variation in perceived stress (Adjusted $R^2=0.064$). The multiple linear regression showed that for the first model, as physical activity increased by one standard deviation perceived stress decreased by 0.222 standard deviations (Standardized $\beta = -0.222$, $p=0.027$). The multiple linear regression also showed that for the second model, as physical activity increased by one standard deviation perceived stress decreased by 0.216 standard deviations (Standardized $\beta = -0.216$, $p=0.031$). The small negative significant association between physical activity and perceived stress noted in the first model remained in the second model where gender, age, and BMI were taken in to account (table 5).

Table 5: Hierarchical regression of the index physical activity, index perceived stress, gender, age, and BMI (n=99).

	<i>b</i>	SE B	β	p-value
Step 1 (unadjusted)				
Constant				
Physical activity	-0.011	0.005	-0.222	0.027
Step 2 (adjusted)				
Constant				
Physical activity	-0.011	0.005	-0.216	0.031
Gender	-2.110	1.614	-0.129	0.194
Age	-0.509	0.269	-0.192	0.061
BMI	0.064	0.206	0.032	0.754

Model 1: Adjusted $R^2=0.039$. Model 2: Adjusted $R^2=0.064$.

b= Unstandardized B.

SE B = Coefficients Std. Error.

β =Standardized Coefficients Beta.

6 DISCUSSION

In the present study, the aim was to study the association between physical activity and perceived stress among college- and university students in Sweden, and to investigate whether gender, age, and BMI were confounding factors regarding the association between physical activity and perceived stress.

The result showed that: According to the correlation analysis, there was a small negative significant association between physical activity and perceived stress. According to the regression analysis, there was a small negative significant association between physical activity and perceived stress, which remained after considering gender, age, and BMI.

6.1 Method discussion

6.1.1 *Methodological approach*

In this study, a quantitative methodological approach has been used. This, in turn, has made it possible to study the prevalence of and the association between physical activity and perceived stress among students. By using a quantitative methodological approach, personal bias can be hindered since the researcher and the participants are not in direct contact (Bruce et al., 2018). Furthermore, the survey was carried out online and the participants was not disturbed by the authors physical presence. The benefit of this may be that more sincere answers may have been provided.

It would have been of interest to in-depth study students' thoughts and perspectives on physical activity and perceived stress. This would have been possible with a qualitative methodological approach. A qualitative methodological approach focuses on capturing the reasons for phenomenon (Creswell & Creswell, 2018). However, the study focused on the association between physical activity and perceived stress. Therefore, a quantitative approach was more suitable.

6.1.2 *Study design*

In the present study, a cross-sectional survey was performed. A limitation with a cross-sectional survey is that, a causal direction of associations cannot be clarified (Merrill, 2013). This, in turn, have hindered the possibility to study a causal direction of the association between physical activity and perceived stress. The study has not clarified if physical activity affects perceived stress or if perceived stress affects physical activity, which can be considered a weakness. Another weakness with surveys is that response bias can affect the study result (Merrill, 2013). For example, the students that were physically active and not that stressed may have been more likely to participate, in comparison to students that were not physically active and have been experiencing stress. Consequently, the result could represent a specific group among college- and university students. However, the author did not have the

resources to choose another study design. Furthermore, for example, cross-sectional surveys allow the researcher to study associations between different variables (Creswell & Creswell, 2018). By therefore choosing a cross-sectional survey, it was possible to investigate the aim of the study which could be considered a strength.

6.1.3 Sample and sample size determination

The study population was college- and university students in Sweden. As a result of having 110 participants, the sample may not represent the whole study population. If the time was not limited to a specific time frame, the author would have aimed for a higher sample size. The sampling method used was a snowball sampling. A snowball sampling means that researchers can use networks and contacts to reach participants that are of use to the study (Bruce et al., 2018). A benefit with choosing a snowball sampling was that the questionnaire could easily reach a number of participants. Furthermore, some of those who re-shared the questionnaire were students themselves and the questionnaire could therefore reach more participants. A possible weakness with snowball sampling is that it may limit the variety of different students, since the questionnaire may reach some students attending specific classes, programs or colleges- and universities in Sweden. This, in turn, can cause response bias.

The sample size was determined by a guideline focusing on the sample size needed in order to conduct a regression analysis. The guideline highlights that the sample size needed is calculated by adding the number of independent variables with the number 104 (Field, 2009). Furthermore, having used a guideline can be considered a strength. However, if the author would have conducted a power analysis, an additional understanding would have emerged about the sample size needed.

6.1.4 Data collection: Variables and questionnaire

The questionnaire (Appendix D) was created by collecting relevant questions from previous surveys. By using questions from the Swedish national public health survey health on equal terms 2020 and 2014, as well as the Swedish version of perceived stress scale, physical activity and perceived stress could be measured. A collection of survey questions from existing questionnaires could give a reliable impression, which can be seen as a strength.

When carrying out questionnaires, it is beneficial to consider the length and content of the questionnaire (Bruce et al., 2018). The questionnaire consisted of 10 questions and can be perceived as a manageable questionnaire to carry out. Furthermore, some participants stated that they thought that the questionnaire was simple and easy to understand, which also can be considered a strength.

6.1.5 Data collection: Data gathering

The data was collected by conducting an online questionnaire. This made it possible to easily publish the questionnaire and collect data over time. A risk with carrying out online questionnaires is that it can give an impersonal impression (Evans & Mathur, 2005). However, it could be considered a strength not to have the author present since participants were not obligated to fill in the questionnaire at a specific time or place. A weakness with choosing to have the questionnaire on Google Forms was that it was possible for participants to answer the questionnaire multiple times. An alternative to hinder this was to require the participants email addresses. This, in turn, would show who participated which would violate the ethical aspect anonymity and therefore, it was avoided.

Choosing to upload the questionnaire on Facebook had its advantages and disadvantages. The advantage was like mentioned earlier, that many college- and university students could be reached both easily and quickly. However, a disadvantage could be that participants may have experienced stress due to being exposed to information on Facebook. This, in turn, could ultimately have affected the reporting of perceived stress. Furthermore, this makes it difficult to know whether the reporting of perceived stress concerns the elements of the Swedish version of perceived stress scale, or if it is partly due to using Facebook. Although, it was not possible to distribute the questionnaire on colleges and universities in Sweden due to the COVID-19 virus. Evidentially, the only feasible choice was to upload the questionnaire on Facebook.

6.1.6 Data collection: Handling of data and processing of data

The survey question about physical exercise and the survey question about everyday activities (Appendix D) were merged into an index. Additionally, the questions about perceived stress (Appendix D) were also combined into an index. These procedures were necessary since the concepts cannot be investigated with one question. In addition, the aim was to study the association between physical activity and perceived stress from a wider perspective, which demonstrates that these procedures were advantageous.

6.1.7 Methods of analysis

In order to describe the sample, descriptive analysis was carried out which made it possible to report general information about the sample. The first study question: *Is there an association between physical activity and perceived stress among college- and university students?*, was answered by using the test Pearson's correlation coefficient. Pearson's correlation coefficient can be carried out by using two continuous variables (Field, 2018) and relies on data that is normally distributed (Creswell & Creswell, 2018). The indexes physical activity and the index perceived stress were both continuous variables and exhibited normal distribution. The physical activity index had a skew value of -0.123 and a kurtosis value of -0.898. The perceived stress index had skew value of -0.142 and a kurtosis value of 0.337. According to George and Mallery (2010) skew and kurtosis values that range from -2 and 2 are tolerable in representing a normal distribution (George & Mallery, 2010). That both of

these criteria were met was a strength, since it may have provided results that were more representative of the target population. If these criteria were not met, it could generate misleading results and conclusions, which ultimately weakens a study's quality. By using continuous variables and variables that exhibited normal distribution, it was possible to perform a correlation analysis with Pearson's correlation coefficient appropriately.

The second study question: *Is there an association between physical activity and perceived stress among college- and university students after controlling for gender, age and BMI?*, was answered by performing a multiple linear regression. Furthermore, linear models rely on several assumptions, for example, normal distribution (Field, 2018). The index physical activity, the index perceived stress, and BMI showed tolerable values for skewness and kurtosis which was a strength. The variable age was slightly skewed which demonstrates a weakness. Furthermore, it was a weakness that normal distribution was the only assumption investigated. The disadvantage with this was that it was unclear whether the results were valid or not, meaning that, the results in fact may have been somewhat unreliable. Therefore, it is unknown whether it was fully suitable to conduct a multiple linear regression.

6.1.8 Quality criteria

As previously mentioned, the questions concerning physical exercise, everyday activity, and sedentary behavior (Appendix D) have been validated (Folkhälsomyndigheten, 2018). Furthermore, this indicates that the questions have been reviewed and accepted, which is a strength regarding the validity of these questions. The Swedish version of perceived stress scale has adequate construct validity (Eskin & Parr, 1996). The construct validity of the index perceived stress can be questioned, since 12 out of 14 questions from the scale were used which meant that two aspects of perceived stress were not measured. However, only two questions were not chosen and can be considered a low amount of excluded questions.

The external validity which also includes the possibility to generalize results (Creswell & Creswell, 2018) are in the present study limited. This is because the sample was small and consisted of more female than male students. Consequently, it becomes difficult to generalize the results to the study population of college- and university students. A snowball sample may also limit the generalizability, since the participants are not chosen independently in regard to the rest of the participants. This, in turn, can lead to participants that exhibit specific similarities which may limit the generalizability. Furthermore, reliability concerns a scales internal consistency and whether a scale measures an underlying construct (Creswell & Creswell, 2018). As previously mentioned, a Cronbach alpha test was performed of the index perceived stress and the Cronbach alpha value was 0.853. Optimal values are within 0.70 and 0.90 (Creswell and Creswell, 2018) and therefore the scales internal consistency was acceptable. Finally, reliability also concerns stability. The author could not gain stability since lack of resources made it impossible to conduct a similar study.

6.1.9 Research ethics

A well-formulated missive letter (Appendix C) was presented at the beginning of the survey, enabling participants to obtain information about the study. The ethical principles information requirement, consent requirement, confidentiality requirement, and utilization requirement were followed and considered throughout the study.

Research topics that are sensitive can differ throughout time and among societies (Vetenskapsrådet, 2002) and consequently this may be an ethical aspect to consider. In addition, questions 11 and 14 of the Swedish version of perceived stress scale were excluded and the remaining questions were used. These questions were excluded because they can be considered as sensitive and in order to not bother the participants these specific questions were not chosen. In addition, no questions were mandatory to fill in which was chosen for the purpose of not forcing any answers. Therefore, each participant could decide on which questions they were willing to answer.

6.2 Result discussion

In the present study, there was a small negative significant association between physical activity and perceived stress among college- and university students. In addition, a similar result was highlighted in a systematic review, where the result showed that there is an association between vigorous intensity physical activity and low risk of perceived stress (Dogra et al., 2018). This was in contrast to a study based on 74 college students which showed that there is a non-significant association between physical activity and perceived stress (Hubbs et al., 2012). A possible explanation for these results could be due to the fact that the sample sizes differed. A sample consisting of few participants often generates a lower possibility of reaching statistically significant results. Meanwhile, a sample consisting of many participants often generates a higher possibility of reaching statistically significant results (Field, 2018).

The result should also be interpreted with caution since when the data collection was conducted, the COVID-19 virus was spreading in Sweden (Folkhälsomyndigheten, 2020e). It is possible that the perceived stress reported by students were somewhat higher now, while the time spent on physical activity may have been lower now, than if the study was carried out during another time period. However, the students were asked to report an average time spent on physical activity if the time varied during a year. Therefore, the reporting of physical activity may not be as misleading as the reporting of perceived stress.

Furthermore, the study result implies that the more physically active the students were, the less stressed they were. Furthermore, this association can be understood with the help of the model of health determinants. The model describes that interlinking layers and multiple factors affect an individual's health. In addition, one of those layers are individual lifestyle factors and concerns, for example, physical activity (Dahlgren & Whitehead, 2007) which is a protective factor for ill health (WHO, 2020b). Therefore, the association that increased

physical activity decreases perceived stress could be explained by the protective impact physical activity has on health.

In the present study, the multiple linear regression showed that, there was a small negative significant association between physical activity and perceived stress, which remained after controlling for gender, age, and BMI. Clarifying that, physical activity predicts perceived stress independently of gender, age, and BMI. This result was consistent with a cross-sectional study based on 14,804 undergraduate students from United States. After adjusting for the variables response rate, meeting vigorous physical activity recommendations in high school, sex, age, weight status (underweight, normal overweight, obesity, class II obesity), race, ethnicity, socioeconomic position, year in school, and socializing, the result showed that participants who were physically active by performing vigorous physical activity had a lower risk for perceived stress (Vankim & Nelsson, 2013). In addition, a study based on 3864 college sophomore students from China showed that sufficient physical activity generated a lower risk for perceived stress. This result emerged after adjusting for age, BMI, nationality, mothers' educational level, usage of tobacco, alcohol, and sleep quality (Zhai et al., 2020).

The study result, in turn, showed the effect that physical activity has on the reporting of perceived stress and particularly demonstrated how these confounding variables do not interfere. This was particularly evident when the coefficient from step one and the coefficient from step two were compared. This also demonstrated that gender, age, and BMI somewhat confounded the association between physical activity and perceived stress. WHO (2020b) mentions that physical activity is a determining factor for health development (WHO, 2020b). That, in turn, highlights advantages for college- and university students to engage in physical activity during their studies. Descriptive analysis highlighted that during a week, college- and university students engaged in physical activity from 15 activity minutes to 540 activity minutes. This result demonstrated that there was a variation in the time spent on physical activity and indicates a need for increased physical activity among some students.

Furthermore, the present study did not adjust for response rate, meeting vigorous physical activity recommendations in high school, race, ethnicity, socioeconomic position, year in school, socializing, nationality, mothers' educational level, usage of tobacco, alcohol, and sleep quality. Therefore, it was not certain that the association shown in the present study would remain if the author would have adjusted for these variables. Clarifying that, comparability with other studies must be done with caution. In addition, it was possible that college- and university students from the United States and China differ from students from Sweden. This showed that there was a need to further investigate the association between physical activity and perceived stress among Swedish students independently from a variety of potential confounding variables.

The result can be further understood with the help of the model of health determinants, which highlights that other factors than physical activity influences an individual's health (Dahlgren & Whitehead, 2007). Other factors are, for example, those variables that other studies have adjusted for. Therefore, it was possible that other protective factors than physical activity may have had an impact on how students have reported their perceived

stress. It was possible that, for example, other individual lifestyle factors, social and community networks, living and working conditions, and general socio-economic, cultural, and environmental conditions have influenced the degree of students perceived stress. However, to study the influence of these factors in relation to perceived stress was not within the scope of this study. Therefore, their potential impact on college- and university students perceived stress was unclear.

6.3 Public health relevance and suggestions for further research

The result indicates that interventions can be of use in order to improve students perceived stress and should focus on enabling students to be physically active. Public health sciences are a scientific field that focus on improving quality of life by either preventing ill-health or promoting health (WHO, 1998). Therefore, enabling students to be physically active is one strategy that can strengthen their quality of life. A public health strategy that can be beneficial for students both during and after their studies.

The present study focused on in general examining the association between physical activity and perceived stress among students. Therefore, future studies could study the association between these variables among different subgroups of students. If this is studied, more group specific interventions can be created.

7 CONCLUSIONS

- There was an association between physical activity and perceived stress among college- and university students.
- The association between physical activity and perceived stress among college- and university students remained after controlling for gender, age, and BMI.

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APPENDIX A; Missive letter in Swedish

En enkätundersökning om fysisk aktivitet och stress bland högskole- och universitetsstudenter

Missivbrev

Hej!

Mitt namn är Kaltum Ali Mohamed och jag studerar Masterprogrammet i folkhälsovetenskap inom hälsa och välfärd på Mälardalens högskola. Jag skriver denna termin min magisteruppsats och i samband med det genomför jag en enkätundersökning.

Syftet med studien är att studera sambandet mellan fysisk aktivitet och stress bland högskole- och universitetsstudenter, samt om kön, ålder och BMI påverkar sambandet mellan fysisk aktivitet och stress. Detta innebär att du som besvarar enkäten för närvarande ska vara student på någon högskola eller något universitet i Sverige.

Enkäten tar ca 15 minuter att besvara. De flesta enkätfrågor kommer från den nationella folkhälsoenkäten Hälsa på lika villkor medan några enkätfrågor kommer från den svenska versionen av Perceived Stress Scale.

Det är frivilligt att delta i studien och du kan avbryta din medverkan när som helst. Det innebär att det är enbart du som bestämmer om du vill delta i studien. De uppgifter och svar du lämnar kommer att behandlas med största möjliga konfidentialitet. Du är som respondent anonym och dina svar kommer att lagras i ett Google konto som är lösenordskyddat. Om du vill läsa mer om Googles Sekretesspolicy kan du göra det via denna länk: <https://policies.google.com/privacy>

Vidare är det bara jag och min handledare som kommer att ha tillgång till svaren och analysen av data görs med en lösenordskyddad dator. Efter att examensarbetet har examinerats och blivit godkänt kommer de svar du lämnat raderas.

Resultatet från enkätundersökningen kommer enbart att användas och presenteras i mitt examensarbete. Resultatet kommer att presenteras utifrån begreppet högskole- och universitetsstudenter, vilket kommer att ske med syfte att inte avslöja enskilda individers svar. Slutligen kommer examensarbetet publiceras i databasen DiVA och det förväntas ske juni 2020.

I samband med att du trycker på skicka ger du ditt medgivande i att delta i studien. Om du har några frågor eller funderingar kan du kontakta mig, Kaltum Ali Mohamed. Tack för din medverkan!

Kontaktuppgifter



APPENDIX B; Questionnaire in Swedish

Bakgrundsfrågor
<p>1. Vilken högskola eller universitet studerar du vid?</p> <p>Ditt svar</p>
<p>2. Hur definierar du din könsidentitet?</p> <p><input type="radio"/> Kvinna</p> <p><input type="radio"/> Man</p> <p><input type="radio"/> Annan</p> <p><input type="radio"/> Jag vet inte</p>
<p>3. Hur gammal är du? Svara i hela år.</p> <p>Ditt svar</p>
<p>4. Hur lång är du? Svara i hela centimeter.</p> <p>Ditt svar</p>
<p>5. Hur mycket väger du? Svara i hela kilo. Om du är gravid ange hur mycket du brukar väga.</p> <p>Ditt svar</p>
<p>6. Hur bedömer du ditt allmänna hälsotillstånd?</p> <p><input type="radio"/> Mycket bra</p> <p><input type="radio"/> Bra</p> <p><input type="radio"/> Någorlunda</p> <p><input type="radio"/> Dåligt</p> <p><input type="radio"/> Mycket dåligt</p>

Frågor om din fysiska aktivitet

Om din aktivitet varierar under året, försök ta något slags genomsnitt. Fråga 7a) handlar om regelbunden motion och träningsaktiviteter som gör att du blir andfådd och svettas medan fråga 7b) handlar om måttligt ansträngande fysisk aktivitet som får dig att andas något kraftigare än normalt t.ex. promenader i rask takt, trädgårdsarbete, cykling eller simning.

7a) Hur mycket tid ägnar du en vanlig vecka åt fysisk träning som får dig att bli andfådd, till exempel löpning, motionsgymnastik eller bollsport?

- ☐ 0 minuter/ingen tid
- ☐ Mindre än 30 minuter
- ☐ 30-59 minuter (0,5-1 timme)
- ☐ 60-89 minuter (1-1,5 timmar)
- ☐ 90-119 minuter (1,5-2 timmar)
- ☐ 2 timmar eller mer

7b) Hur mycket tid ägnar du en vanlig vecka åt vardagsaktiviteter, till exempel promenader, cykling eller trädgårdsarbete? Räkna samman all tid (minst 10 minuter åt gången).

- ☐ 0 minuter/ingen tid
- ☐ Mindre än 30 minuter
- ☐ 30-59 minuter (0,5-1 timme)
- ☐ 60-89 minuter (1-1,5 timmar)
- ☐ 90-149 minuter (1,5-2,5 timmar)
- ☐ 150-299 minuter (2,5-5 timmar)
- ☐ 5 timmar eller mer

8. Hur mycket sitter du under ett normalt dygn om man räknar bort sömn?

- ☐ Mer än 15 timmar
- ☐ 13-15 timmar
- ☐ 10-12 timmar
- ☐ 7-9 timmar
- ☐ 4-6 timmar
- ☐ 1-3 timmar
- ☐ Aldrig

9. Vill du öka din fysiska aktivitet?

- ☐ Ja, och jag tror att jag kan klara det själv
- ☐ Ja, men jag behöver stöd
- ☐ Nej

Frågor om stress

Följande frågor handlar om Dina upplevelser, känslor och tankar under den senaste månaden. För varje fråga får Du ange hur ofta Du har upplevt, känt eller tyckt på ett speciellt sätt. Vissa frågor kan verka likartade men Du ska ändå behandla varje fråga för sig. Besvara därför varje fråga utan någon längre betänketid. Försök inte räkna ut hur ofta Du har känt dig på ett visst sätt, försök i stället uppskatta det som verkar vara det rimligaste för Dig enligt svarsalternativen. Det finns inga riktiga eller felaktiga svar på frågorna nedan. Ta ställning till varje alternativ och klicka i Ditt svar.

10. Hur ofta har du under den senaste månaden:

	Aldrig	Sällan	Ibland	Ganska ofta	Mycket ofta
Blivit upprörd över något som skett helt oväntat?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Känt att Du inte haft kontroll över de viktiga faktorerna i Ditt liv?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Känt Dig nervös och stressad?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Tagit itu med dagliga förtret på ett tillfredställande sätt?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Effektivt hanterat avgörande förändringar i Ditt liv?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Känt Dig säker på Din förmåga att hantera Dina personliga problem?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Tyckt att saker och ting har utvecklat sig som Du velat?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Känt att DU inte kunde hantera allt som måste göras?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Känt att Du har haft kontroll över irriterande moment i Ditt liv?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Känt att Du har haft kontroll över saker och ting?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Kommit på Dig själv med att fundera över saker Du måste utföra?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Kunnat bestämma hur Du skulle använda Din tid?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

APPENDIX C; Missive letter in English

A questionnaire about physical activity and stress among college- and university students

Missive letter

Hi!

My name is Kaltum Ali Mohamed and I am studying the master's program in public health sciences within health and welfare at Mälardalen university. This semester I am writing my magister thesis and in regard to that I am conducting a survey.

The aim of the study is to examine the association between physical activity and stress among college and university students, and to study whether gender, age and BMI affect the association between physical activity and stress. This means that, you who are answering the questionnaire should currently be a student at some college or university in Sweden.

The survey takes approximately 15 minutes to answer. Most questions come from the national public health survey Health on equal terms, while some questions come from the Swedish version of the Perceived Stress Scale.

It is voluntary to participate in the study and you can choose to discontinue your participation at any time. This means that, it is only you who decides whether you want to participate in the study. The information and answers you provide will be treated with the utmost confidentiality. As a respondent, you are anonymous, and your answers will be stored in a Google account that is password protected. If you would like to read more about Google's Privacy Policy, please do so via this link:

<https://policies.google.com/privacy>

Furthermore, only me and my supervisor will have access to the answers and the analysis of data is done with a password-protected computer. After the thesis has been examined and approved, the answers you have submitted will be deleted.

The study results will only be used and presented in my thesis. The result will be presented by using the concept college- and university students, which will be done with the aim of not revealing specific individual answers. Finally, the thesis will be published in the DiVA database and it is expected occur in June 2020.

When you press send, you give your consent to participate in the study. If you have any questions or concerns, please contact me, Kaltum Ali Mohamed.
Thank you for your participation!

Contact information



APPENDIX D; Questionnaire in English

Background variables

1. Which college or university do you study at?

Ditt svar

2. How do you define your gender identity?

- ☐ Female
- ☐ Male
- ☐ Other
- ☐ I don't know

3. How old are you? Answer by reporting the whole age.

Ditt svar

4. How tall are you? Answer by reporting in whole centimeters.

Ditt svar

5. How much do you weigh? Answer by reporting in whole kilograms. If you are pregnant, indicate how much you usually weigh.

Ditt svar

6. How do you assess your general state of health?

- ☐ Very good
- ☐ Good
- ☐ Fair
- ☐ Poor
- ☐ Very poor

Questions about your physical activity

If your activity varies during the year, try to take some sort of average. Question 7a) is about regular exercise and exercise activities that make you feel breathless and sweaty while question 7b) is about moderately strenuous physical activity that causes you to breathe somewhat more forcefully than usual e.g. walking at a brisk pace, gardening, cycling or swimming.

7a) How much time do you spend on a regular week on physical exercise that makes you breathless, such as running, gymnastics or ball sports?

- ☐ 0 minutes/no time
- ☐ Less than 30 minutes
- ☐ 30-59 minutes (0.5-1 hour)
- ☐ 60-89 minutes (1-1.5 hours)
- ☐ 90-119 minutes (1.5-2 hours)
- ☐ 2 hours or more

7b) How much time do you spend on a regular week on everyday activities, such as walking, biking or gardening? Count all the time (at least 10 minutes at a time).

- ☐ 0 minutes/no time
- ☐ Less than 30 minutes
- ☐ 30-59 minutes (0.5-1 hour)
- ☐ 60-89 minutes (1-1.5 hours)
- ☐ 90-149 minutes (1.5-2.5 hours)
- ☐ 150-299 minutes (2.5-5 hours)
- ☐ 5 hours or more

8. How much do you sit during a normal day if you count off sleep?

- ☐ More than 15 hours
- ☐ 13-15 hours
- ☐ 10-12 hours
- ☐ 7-9 hours
- ☐ 4-6 hours
- ☐ 1-3 hours
- ☐ Never

9. Do you want to increase your physical activity?

- ☐ Yes, and I think I can do it myself
- ☐ Yes, but I need support
- ☐ No

Questions about stress

The following questions are about your experiences, feelings and thoughts during the past month. For each question you can state how often you have experienced, known or thought in a special way. Some questions may seem similar but you should still deal with each question individually. Therefore, answer each question without any longer reflection time. Do not try to calculate how often you have felt in a certain way, instead try to estimate what seems to be the most reasonable for you according to the response options. There are no correct or incorrect answers to the questions below. Consider each question and click in your answer.

10. How often have you during the past month:

	Never	Rarely	Sometimes	Quite often	Very often
Been upset because of something that happened unexpectedly?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Felt that you were unable to control the important things in your life?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Felt nervous and stressed?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Dealt successfully with irritating life hassels?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Felt that you were effectively coping with important changes that were occurring in your life?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Felt confident about your ability to handle your personal problems?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Felt that things were going your way?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Found that you could not cope with all the things that you had to do?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Been able to control irritations in your life?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Felt that you were on top of things?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Found yourself thinking about things that you have to accomplish?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Been able to control the way you spend your time?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>



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