BSc in psychology

The effects of physical activity on life satisfaction: A study on Icelandic adolescents

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Name: Thelma Björg Magnúsdóttir
ID number: 2004912979
Supervisor: Ársæll Már Arnarsson
Foreword and acknowledgements

Submitted in partial fulfilment of the requirements of the BSc Psychology degree, Reykjavik University, this thesis is presented in the style of an article for submission to a peer-reviewed journal.

I would like to thank my supervisor for patience and good guidance throughout the process of making this thesis, I would also like to thank HBSC for their contribution, in allowing me to access their database ‘Heilsa og lifskjör skólanema 2013/14’ last, but not least I would like to thank my family and friends for their moral support during my years in Háskólinn í Reykjavík.
Abstract

Well-being and life satisfaction are complex concepts based on subjective evaluation of quality and satisfaction of life. This study was conducted to see if physical activity affects life satisfaction among adolescent. Numerous studies have examined the determinants of well-being. The variables used in this study were consistent with previous researches in this particular field, however the current study was conducted in Iceland. The hypotheses in this study were two, the first was that physical activity contributes to greater life satisfaction among young people. The second hypothesis was that boys evaluate their life satisfaction generally as better than girls. To answer these hypotheses a detailed questionnaire was sent to all students in upper secondary schools in Iceland. A population-based sample of 3,618 students in tenth grade, 1,783 males and 1,731 females was used. These numerical data were obtained from an existing international study named Health Behavior in School-aged Children (HBSC), which collects information about welfare, health, social environment and living conditions of adolescent. The results in this study were consistent with prior researches since boys reported higher life satisfaction than girls. Physical activity had a positive impact on life satisfaction of participants regardless of their gender.

Keywords: Life satisfaction, health, depression, physical activity and well-being

Útdráttur


Lykilorð: Lifs ánægja, heilsa, þunglyndi, líkamleg hreyfing og vellíðan
The effects of physical activity on life satisfaction: A study on Icelandic adolescents

Inactivity is a growing problem among adolescents in western countries ("WHO | Physical activity," n.d.). According to World health organization it’s one of the main causes of death worldwide and estimated number of 3.2 million deaths per year can be linked to inactivity. By reducing behavioral risk factors such as inactivity, the probability of diseases such as stroke, type 2 diabetes and cardiac diseases could be decreased by 80%, it is also estimated that the risk of cancer could be reduced by one third by increasing physical activity among mankind (Lee et al., 2012)

Increased sedentary lifestyle and reduced physical activity can be traced to rapid technological development (F. Ng, Dodd, & Berk, 2007). Nowadays people walk less than before as private cars are much more common and transportation is much easier (Sallis & Glanz, 2009). Computer usage and television viewing has also increased greatly, leading to inactive lifestyles. Researches show that physical activity is rapidly declining all over the world (S. W. Ng & Popkin, 2012). Therefore healthcare agencies across the globe have tried to encourage the public to increase physical activity for health prevention and physical advances ("Public Policy | National Coalition for Promoting Physical Activity,” n.d.).

Health benefits of physical activity have been acknowledged since ancient times, and physicians and philosophers such as Plato and Hippocrates believed in the positive relationship of being physically active and healthy (MCKinney et al., 2016) These philosophers were right, as studies have consistently shown that being physically active reduces the risk of noncommunicable diseases and mental disorders. Apart from its prevention potential it also improves sleep and overall physical health (Lee et al., 2012). Multiple researches have shown that physical activity can reduce symptoms of mental disorders and
improve life satisfaction among individuals (Lees & Hopkins, 2013; Stanton, Happell, & Reaburn, 2014; Ströhle, 2009).

Before we go any further it is necessary to properly define the main subject of this thesis. Physical activity is a movement of skeletal muscles which causes energy expenditure beyond the energy that the body needs to maintain its vital functions, this process causes the organism to burn calories. The movement increases heart rate, breathing becomes more frequent and the body starts to sweat (“Physical activity,” 2016). When regular exercise is performed the body’s resistance increases, blood vessels strengthens and blood stream becomes more efficient (Harvard, 2014).

Endurance is divided into two categories, aerobic and anaerobic. The difference between these concepts lies in the oxygen use, in aerobic exercises oxygen is transferred through the body to the muscles and is essential, however oxygen is not present in anaerobic exercises (Lukács & Barkai, 2015). Aerobic exercises increases our energy, reduces stress, strengthens the heart and the lungs, leading to increased well-being. Fitness in the form of resistance and strength training is also extremely important to promote muscle growth, allow strength development to occur and to maintain the boy’s fitness level (Sigurðardóttir, 2016). It is recommended that individuals dedicate themselves to at least 150 minutes a week of moderate to intense exercise for health prevention and reinforcement (McKinney et al., 2016).

There is a general belief that physical activity can reduce or even prevent symptoms of depression, therefore many researchers have studied the relationship between exercise and depression (Craft & Perna, 2004; Stanton & Reaburn, 2014; Wolff et al., 2011a). Depression is a serious problem that affects the individual and the entire community, it is one of the most common mental illnesses in the world and a leading cause of disability worldwide (Ferrari et al., 2013). It is estimated to affect 350 million people across the globe and in the worst cases
in can lead to death, with 800 000 people committing suicide each year due to depression (WHO | Depression,” n.d.). According to the Diagnostic and Statistical Manual of Mental Disorders, fourth edition, depression entails chronic sadness, apathy, significant changes in weight, insomnia or hypersomnia, feelings of worthlessness and recurrent thoughts of death. Individuals that are depressed may also experience digestive disorders, lack of energy, fatigue and concentration difficulties (Widiger & Samuel, 2005). Diagnostic criteria for depression assumes that depressed individuals experience constant melancholy for two weeks or longer and show lack of interest in hobbies, that previously brought them joy and satisfaction (“WHO | Depression,” n.d.). Depending on severity, depression is categorized in to three groups: mild, moderate or severe. A mild depressive episode affects everyday life to some extent, while severe symptoms have more dramatic impact on the person, it can have a paralyzing effect on functionality and social behavior of the individual (Spitzer, Md, & Williams, 1980). Occasional mood swings and mood disturbances like sadness, disappointment and anger are a part of natural condition, however if individual has persistent feelings of sadness, hopelessness and his thoughts are characterized by the thought that everything is meaningless, then the individual is most likely depressed (Ævarsson, 2004).

In 2020 depression is expected to be the second most common disease of the world. (Carek, Laibstain, & Carek, 2011). The economy gets affected by increasing depression rate and the United States of America are spending over 40 billion dollars each year on medical treatment and on lost work productivity related to depression (Craft, 2005).

Health and life satisfaction is the relationship between physical, mental and social well-being, but not only the absence of physical and mental illnesses (“WHO | Mental health,” 2016). Life satisfaction and happiness are both subjective phenomenon’s based on
self-evaluation, where the individual assesses his or hers own quality of life (Diener & Diener, 1995; Max Roser, 2017).

Studies have shown that physical activity can improve individual’s life satisfaction to some extent and there are number of reasons for that, both biological and psychological (Anderson & Shivakumar, 2013). The biochemical influence on the body includes the brain that controls hormone production, for example physical activity can substantially increase serotonin and endorphins production in the brain, which contributes to sense of well-being (Wolff et al., 2011b).

Cross sectional studies have shown that individuals who exercise regularly consider themselves happier than those who engaged less in physical activity, studies also showed that patients with chronic diseases reduced depressive symptoms by 30% when they participated in physical activity (Herring, Puetz, O’Connor, & Dishman, 2012; Ströhle, 2009). The relationship between physical activity and mental disorders has often been studied, one of these studies was conducted in 2002 by Abu Omar and his associates, they interviewed the participants, their mental health was assessed with Mental health inventory (MHI-5) and with the Energy and vitality scale (EVI-scale). Physical activity was measured with the international activity questionnaire (IPAQ) and the results indicated that there was a positive relationship between physical activity level and well-being among population subgroups. The participants that where more physically active than the others were generally healthier (Abu-Omar, Rütten, & Lehtinen, 2004).

Researches conducted by HBSC have provided important data to the evidence base regarding physical activity and health by examining wide range of topics regarding, health, trends, prevalence and socioeconomic differences (Borraccino et al., 2009; Inchley, Currie, Todd, Akhtar, & Currie, 2005). Borraccino et al examined socioeconomic status (SES),
physical activity, sedentary behaviors (SB) and physical activity guidelines (PAGL). They found out that none of the 32 countries they examined met the PAGL and the countries showed relatively the same pattern throughout the study, the younger children where more physically active and physical activity declined with age. Boys were significantly more active than girls and most countries showed significant relationship between SES and weekly moderate to vigorous physical activity (MVPA).

In order to implement population change regarding physical activity Sallis et al emphasized the importance of operating on multiple levels, focusing on subjects beyond behavior and leisure time (Sallis et al., 2006). Effective intervention should also include ecological models that ensure the public of protected and charming environment in convenient distances. Collaboration between professionals in geography, urban planning, transportation, mass media along with educational programs are also important when interventions regarding physical activity are designed (Sallis et al., 2006).

It is important to counteract to inactive lifestyles of all groups of society but, it is most important to emphasize the group of individuals in the society that are the least active ones (inactive), because these individuals are at the highest risk of all cause-mortality and chronic diseases, a slight increase in physical activity can lead to significant health benefits for these individuals (McKinney et al., 2016). Actions that promote physical health and reduction of anxiety and depression have a positive effects on life satisfaction, physical exercise for example is a simple health promotion, proven to be valuable for future generations (Abu-Omar et al., 2004; James MCKinney et al., 2016; Stanton & Reaburn, 2014; Ströhle, 2009; Vilhjalmsdsson & Thorlindsson, 1992).

The current study was conducted to examine the potential effects of physical activity on life satisfaction among adolescents in Iceland. Physical exercise and self-reported life
satisfaction level was examined to further detail. Based on the above literature it was hypothesized that: 1) Physical exercise has positive effects on life satisfaction; 2) Boys have higher life satisfaction than girls.

**Method**

**Data**

The study was conducted from the year 2013 to 2014, in August and January. The data that was used in this study was from an international study named Health Behavior in School-aged Children (HBSC). Which is one of the most comprehensive studies at present time. The organization focuses on health and living conditions of schoolchildren (“HBSC,” 2017). HBSC is an international study initiated in 1982, at that time only three countries participated. Researchers from England, Finland and Norway developed a joint research plan for the purpose of examining the status and well-being of schoolchildren (HBSC, 2017). Today over 350 researchers from 45 countries are involved and the main sponsor of the project is World Health Organization (WHO). Iceland first participated in the year 2006, ever since then they participated in the project by conducting a survey every four years.

**Participants**

The participants where students from 165 elementary schools in Iceland from 25 municipalities across the country. It was presented to all adolescents in 6th 8th and 10th grade in Iceland. However, in the present study, students from 10th grade in Iceland were examined in more detail. The total sample consisted of 3618 students, of which 1783 (50.7%) boys and 1731 (49.3%) girls therefor the gender ratio was quite equal. However, 104 (2.9%) students did not disclose their gender. The response rate of the study was exemplary.
as overall response was 97.1%. Participants were volunteers and received no fee for participation in this study.

**Instruments and Measures**

This study is based on a questionnaire concerning health of adolescent in Iceland, more specifically in terms of physical activity and well-being. The questionnaire consisted of 112 questions on 28 pages regarding health and living standards among teenagers in Iceland. Since all 10th graders in Iceland participated in the study the generalizations was of good value. The questionnaire was put together by HBSC and participants were asked about factors such as gender, physical activity, eating habits, school, health, family, friends, social environment and social issues. This research however only uses three of those questions focusing on life satisfaction and physical activity based on gender (Appendix B). Life satisfaction was measured with a life ladder which is a form of question made like a ladder, where students give their lives a grade ranging from 0 to 10, (0= worst possible life condition to 10= best possible life condition). The question about life satisfaction was presented with a picture of a ladder and a clarification which read: “Here is a picture of a ladder at the top of the ladder, the number '10' represents the best possible life you could have and at the bottom is the figure '0' representing the worst possible life that you may have. What stage is your life right now? Mark the box in the figure that describes your life the best” see (Appendix C). Questions about physical activity (Appendix D) were also examined and the participants were asked how many times they had engaged in it during the last seven days. The answers ranged from “Every day” to “less than once a week”. Participants were also asked: “Outside of normal school hours: How often do you engage in physical exercise in your spare time that
gets you to breathe more heavily or break a sweat?” The answers were “Every day”, “4-6 times a week”, “3 times a week”, “2 times a week”, “Once a week”, “less than once a week”.

The HBSC questionnaire has been evaluated for reliability and validity by numerous of researchers (Booth, Okely, Chey, & Bauman, 2001; Rangul, Holmen, Kurtze, Cuypers, & Midthjell, 2008) for example Booth et al examined the physical activity portion of the questionnaire and found it to be of good reliability (67% to 85%) in their examination they used a large sample of Australian adolescents at the age 13 and 15 year old (Booth et al., 2001). Researchers have also compared HBSC items assessing physical activity and the International Physical Activity Questionnaire (IPAQ, short version) (Rangul et al., 2008). In this comparison Rangul and associates found that the HBSC items to be of better validity (.33 to .39) than the IPAQ (.10 to .62) and the items were also reliable (intraclass correlation to be =.71 for frequency and .73 for duration).

**Design and Data Analysis**

The statistical software IMB SPSS Statistics (SPSS) in 20th edition was used to process and analyze all numerical data. All figures and tables were made with Excel 2016. The questionnaire that was used in the study was cross-sectional correlation study where the relationship between two independent variables and one dependent variable was explored. The first independent variable was gender, either a boy or a girl. The second independent variable was about overall physical activity level and the dependent variable in this study was the student’s life satisfaction level. Life satisfaction level was measured with the life-satisfaction scale that was published in 1965 by Hadley Cantril (Cantril, 1965). The scale included these instructions: Here is a ladder place yourself where you feel you belong 0=
worst possible life you could live and 10= best possible life you could live.

Factorial ANOVA was used to determine the interaction effects between the variables and analyticity was applied to the alpha coefficient of 0.05 or 95% confidence limits.

**Procedure**

All elementary schools in Iceland were contacted and requested for participation in the study. Parents or guardians of all participants were informed of the research by a letter containing all the information’s about their children’s participation and they were given the opportunity to refuse participation on behalf of their children. The study was submitted to all students who were present in school on the day that the study was conducted. Numerous professionals and university students took an active part in the study. All participants were advised to ask the teacher for help if it became necessary, students were also made aware that the survey was anonymous so it was not possible to trace their answers back and all their answers were confidential. Participants were asked to answer the questionnaire to the best of conscience and to put the questionnaire in a sealed envelope when they had finished.

**Results**

The main objective of this study was to investigate whether physical activity would affect life-satisfaction among Icelandic adolescent and whether there was difference between the sexes.

Participants life- satisfaction level ranged from 0 -10. Most participants or 27.5% said that their life satisfaction level was 8 out of 10 points. Most of the participants were generally satisfied with their life and assessed their life satisfaction level between 8 and 10 or 57.7% of
the participants, however there were few participants who believed that their life was the worst possible life they could live or 0.6%.

Figure 1 shows life satisfaction levels amongst participants, where 0 represents the worst possible life they could live and 10 represents the best possible life they could live.

![Figure 1. Life satisfaction level amongst participants.](image)

Participants were asked how many times per week they performed physical activities. The sample seemed to contain a large group of very athletic participants since most participants (38.8%) exercised 4-6 times per week and few exercised less than once a week or 7.8%. Figure 2 below illustrates the distribution of the total scores of physical-activity levels amongst participants.
Figure 2. Physical activity level amongst participants.

Overall, boys exercised more frequently than girls and their self-rated life-satisfaction level was higher than girls’. Boys who were exercising daily reported on average \((M = 8.13)\) in life-satisfaction, but the girls estimated their life satisfaction less \((M = 7.68)\). Boys’ total life-satisfaction level \((M = 7.83)\) was also higher than the girls’ \((M = 7.23)\). Life-satisfaction among participants gets lower on average with decreasing exercise; boys who exercise less than once a week estimate their life-satisfaction level \((M = 7.35)\) and girls \((M = 6.57)\), indicating that increased exercise leads to higher life-satisfaction level amongst adolescent regardless of their gender. Table 1 shows descriptive statistics for life-satisfaction levels among adolescents depending on how much the participants exercise.
Table 1.

*Participants mean and total score of life-satisfaction depending on how much they exercise.*

<table>
<thead>
<tr>
<th></th>
<th>Boys</th>
<th>Girls</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>N</td>
<td>M (SD)</td>
</tr>
<tr>
<td>Everyday</td>
<td>426</td>
<td>8.13 (1.51)</td>
</tr>
<tr>
<td>4-6 times a week</td>
<td>652</td>
<td>7.89 (1.58)</td>
</tr>
<tr>
<td>3 times a week</td>
<td>226</td>
<td>7.65 (1.65)</td>
</tr>
<tr>
<td>2 times a week</td>
<td>155</td>
<td>7.39 (1.75)</td>
</tr>
<tr>
<td>once a week</td>
<td>66</td>
<td>7.67 (1.51)</td>
</tr>
<tr>
<td>less than once</td>
<td>97</td>
<td>7.35 (1.83)</td>
</tr>
<tr>
<td>Total</td>
<td>1622</td>
<td>7.83 (1.62)</td>
</tr>
</tbody>
</table>

Results from Factorial analysis of variance (FANOVA) showed that exercise significantly increased life satisfaction level, $F(1, 3191) = 61.359, p < .001$. In addition, boys had significantly higher life satisfaction compared to girls, $F (5, 3191) = 17.571, p < .001$. However, there were no interaction effects between gender and exercise, $F (5, 3191) = 0.892, p = .485$.

A Bonferroni post-hoc test showed that there was a significant difference between those who exercised every day and those who exercised less than once a week $(p < .001)$. However, there was not significant difference between those who exercised once a week, $(p=1.00)$ two times $(p=1.00)$ a week or less than once a week $(p = 1.00)$. 

Discussion

The results of the current study supported both of the hypotheses that were put forth, primary, that physical exercise has positive effects on life satisfaction among adolescents, evidently physical activity that an individual engages in had a positive effect on life satisfaction. The second hypotheses, that boys rate their life satisfaction level higher than girls was also in line with prior researches. The results are consistent with prior studies in this field, for example the study of Abu-Omar, Rüttén, & Lehtinen (2004) showed that participants that exercised daily considered themselves happier than those who exercised less or not at all. Previous studies have found that when physical activity is engaged the brain releases the hormones serotonin and endorphin into the body, these hormones are responsible for the sense of well-being and happiness, the neurotransmitters play a critical role in our happiness and they are stimulated through exercise (Wolff et al., 2011).

This study had important strengths, the sample size was all students in 10th grade in Iceland, so the sample can be generalized to the public. All the teachers got instructions to follow during the experiment, the students were encouraged to ask for help if needed and the research situation was kept as similar as possible between schools. The gender distribution in this sample was relatively equal and there was a good internal validity.

Even though both hypotheses were significant this study also has its limitations, participants can lie and be inconsistent with themselves so we can only hope that they answered with their best conscience and the students who were sick that day did not participate.

In conclusion, this study found that participants that engaged in physical exercise considered themselves happier (their life-satisfaction was rated higher) than those who
engaged less in physical activity and boys rated themselves with higher life satisfaction than girls on average regardless of how much they exercised. These results show the importance of encouraging the public to participate in daily activities and incorporating a brief physical exercise intervention for health promotion and life satisfaction. Future studies in this field should study the relationship of nutrition and physical activity on life satisfaction and well-being. Moreover, it would be interesting to see where the limits lie with physical exercise, does too much exercise lead to anxiety and depression and what kind of exercise, to what extent contribute to maximum health of the individual physically and mentally.

From this data, it is important to promote preventative factors such as regular exercise and nutritious diet to prevent or reduce symptoms of depression and anxiety in order to increase life satisfaction and general health among adolescents all over the world.
References


EFFECTS OF PHYSICAL ACTIVITY ON LIFE SATISFACTION


Appendix A

Heilsa og lífskjör skólanema 2013/14

10. bekkur

- Trúnaðarmál -
Appendix B

1. Ertu strákur eða stelpa?
   □ Strákur
   □ Stelpa

Appendix C

25. Hér er mynd af stiga. Efst í stiganum er talan ‘10’ sem táknar besta hugsanlega lífið sem þú gætir átt og neðst er talan ‘0’ sem táknar versta hugsanlega lífið sem að þú gætir átt. Hvar í þessum stiga er líf þitt núna? Merktu í reitinn hjá þeirri tölu sem lýsir lífi þínu best

   □ 10  Besta hugsanlega lífið
   □ 9
   □ 8
   □ 7
   □ 6
   □ 5
   □ 4
   □ 3
   □ 2
   □ 1
   □ 0  Versta hugsanlega lífið
37. Utan venjulegs skólatíma: Hve oft stundar þú líkamlega hreyfingu (íþróttir, æfingar, sund, eða aðra leiki) í frítíma þínum?

- Á hverjum degi
- 4-6 sinnum í viku
- Þrisvar sinnum í viku
- Tvisvar sinnum í viku
- Einu sinni í viku
- Sjaldnar en einu sinni í viku
- Aldrei