



# **The Youth in Europe Project – The Relation Between Physical Activity and Mental Health**

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### Abstract

The effects of physical activity on mental health was studied, using data from the 2008 Youth in Europe study. The aim of this study was twofold. First, to explore if physical activity predicts depression and anxiety, body-image and self-esteem. Also, to explore if levels of physical activity were similar to levels of depression and anxiety, body-image and self esteem across eleven cities around Europe. Participants were 3000 students in Europe and most of them were 14-16 years old. Partial support was found for the first hypothesis. That is, in some cities physical activity predicted depression and anxiety, body-image and self-esteem but not in others. Partial support was also found for the second hypothesis. Levels of physical activity, depression and anxiety, body-image and self-esteem were similar between some of the cities but different levels were also observed between numerous cities.

Keywords: physical activity, depression, anxiety, body-image, self-esteem

### Útdráttur

Áhrif líkamlegrar hreyfingar á andlega heilsu var rannsakað með því að styðjast við gögn frá árinu 2008 úr Youth in Europe rannsókninni. Markmið rannsóknarinnar var tvíþætt. Í fyrsta lagi, til að athuga hvort líkamleg hreyfing spái fyrir um þunglyndi og kvíða, líkamsmynd og sjálfstraust. Í öðru lagi, til að athuga hvort líkamleg hreyfing og þunglyndi og kvíði, líkamsmynd og sjálfstraust væri svipað í ellefu borgum í Evrópu. Þátttakendur voru 3000 nemendur og voru flestir þeirra á aldrinum 14-16 ára. Stuðningur fannst við fyrri tilgátuna þ.e. í sumum borgum spáði líkamleg hreyfing fyrir um þunglyndi og kvíða, líkamsmynd og sjálfstraust. Einnig fannst stuðningur við seinni tilgátuna. Líkamleg hreyfing, þunglyndi og kvíði, líkamsmynd og sjálfstraust var svipað á milli sumra borganna en það var einnig breytilegt milli ýmissa borga.

Lykilhugtök: líkamleg hreyfing, þunglyndi, kvíði, líkamsmynd, sjálfstraust

*Foreword and Acknowledgements*

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

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### The Relation Between Physical Activity and Mental Health

In the last 5 to 10 years, researchers have concluded that physical activity is related to decrease in anxiety and depression as well as to increase in feelings of general well-being (Landers & Arent, 2001). The most common disorders in the United States are depression and anxiety disorders (Dishman, Washburn, & Health, 2004). In addition, physical inactivity has been shown to be related to higher levels of depression (Weinberg & Gould, 2011).

Youth in Europe – A Drug Prevention Programme is an international project that was initiated by European Cities Against Drugs (ECAD) in 2005. ECAD has approximately 260 signatory cities in 30 countries and it focuses mainly on protecting young people from the injurious effects of drugs. It compares prevention strategies and seeks the best practices across Europe in order to provide valuable information for all those who are involved in protecting young people from drugs.

The project is based on key results from the five year programme „Drug Free Iceland“. The city of Reykjavik, Iceland, serves as the chair and provides management for the programme. The first three surveys were carried out in 2006, 2008 and 2010. The data in this study is based on the 2008 research. The administration and coordination of the studies are carried out by the Icelandic Centre for Social Research and Analysis (ICSRA) at Reykjavík University and in close co-operation with research partners in all the participating cities.

Depression is a widespread problem around the world. The World Health Organization has projected that depression will be second only to cardiovascular disease as the world's leading cause of death and disability by the year 2020 (Murray & Lopez, 1997). Some people have episodes or periods of mild depression which is less extreme than major depression. Jeong et al. (2005) concluded that treating adolescents with mild depression, with dance movement therapy has an effect on the level of serotonin in the brain. Serotonin is a neurotransmitter that is a well known contributor to feelings of happiness. The authors

concluded that dance movement therapy may be useful in improving psychological distress in adolescents with mild depression.

Major depression has been steadily increasing over the past 50 years (Kessler et al., 2003). It affects the person with a range of difficulties including a depressed mood, sleeping problems and cognitive problems (Ahlström, Skarsater, & Danielson, 2010). Community studies of adults show that the prevalence of depression is twice as high for women than for men (Nolen-Hoeksema, 2001). In the last decade, no significant increase have been found in levels of depression among boys while depression has increased among girls (Collishaw, Maughan, Natarajan, & Pickle, 2010).

Anxiety disorders have attracted a considerable amount of research attention. They are the most prevalent psychiatric disorders in children and it is associated with impairments in social and academic functioning (Legerstee, Garnefski, Jellesma, Verhulst, & Utens, 2010). Long (1984) compared different anxiety reduction techniques in a long term study. Jogging was the method that was used as a stress intervention. The results showed that the jogging group was most successful. It was also interesting that those reductions in anxiety were maintained in a follow up study that was conducted 15 weeks later.

Body-image has been defined as the internal, subjective representations of physical appearance and bodily experience (Leone et al., 2011). It is a multidimensional phenomenon which plays a vital role in influencing quality of life. Body-image satisfaction is also associated with developmental, psychological and social factors such as self-esteem and emotional stability (Cash & Pruzinsky, 1990).

Body-image is greatly impacted during adolescence where personal identity is also shaped. Sociocultural influences, biology and the physical environment are major factors in influencing the development of adolescents. Although body-image influences people in many ways, the relation between body-image and psychological well-being is strongest during

adolescence (Carroll, Tiggemann, & Wade, 1999; Cash & Henry, 1995; Frisen, Lunde, & Hwang, 2009).

Self-esteem is a very important aspect of personal well-being. It is defined as how positively or negatively we feel about ourselves (Brown, 1998). Level of self-esteem is quite stable over the lifespan, with correlations of .50 to .70 from childhood to old age (Trzesniewski, Donnellan, & Robins, 2003). It appears that high self-esteem is related to many positive behaviours and life outcomes. People with high self-esteem are happier with their lives than people with low self-esteem (Brown, 1998). They also have fewer interpersonal problems and are more capable of forming satisfying love relationships. In contrast, people with low self-esteem are more prone to psychological problems such as depression and anxiety (Brown, 1998).

Our self-evaluation are often consistent with what others think of us. Miyamoto and Dornbusch (1956) found that people who rated themselves high on attributes such as intelligent and self-confident, were more likely to be rated high by their fellows than those who rated themselves low on these attributes. When the development of self-esteem is studied with children, it appears that children develop higher self-esteem when their parents communicate unconditional acceptance and love.

It has been well documented that there is a connection between physical activity and good mental health (Blumenthal et al., 1999; Hansen, Stevens, & Coast, 2001). Also, some study show that physical inactivity is related to higher levels of depression. While, many studies have explored the relation between physical activity and depression and anxiety, fewer studies have focused on the relation between physical activity and body-image and also on the relation on self-esteem.

The aim of this study is, on one hand, to explore whether physical activity can predict depression and anxiety, body-image and self-esteem and on the other to explore whether

levels of physical activity and depression and anxiety, body-image and self-esteem is similar across the 11 cities that participated in the Youth in Europe study. Based on the aforementioned conclusions it is predicted that physical activity predicts depression and anxiety, body-image and self-esteem. It is also predicted that the level of physical activity, depression and anxiety, body-image and self-esteem is similar in all the cities.

## Method

### Participants

The participants in this study were 12-18 years old students (N=3000). However, most of them were 14-16 years old. They were from 11 cities, that is Kaunas, Klaipeda and Vilnius in Lithuania; Jurmala and Riga in Latvia; Reykjavik in Iceland; Oslo in Norway; Arilje in Serbia; Bucharest in Romania; Istanbul in Turkey; and Sofia in Bulgaria. All classes from all schools within each city were randomly sampled for participation. The samples were classroom-based, clustered within the cities that participated. As can be seen in table 1, the number of participants from each city were similar in all cities except in Arilje and Jurmala where participants were much fewer. Gender ratio is also similar in all cities except in Bucharest where females were around 35%.

Table 1

*Number of Participants in each City and Gender Ratio*

City	N	Males %	Females %
Arilje	82	47.6	52.4
Bucharest	340	65.1	34.9
Istanbul	337	54.2	45.8
Jurmala	73	42.5	57.5
Kaunas	361	48.5	51.5
Klaipeda	252	49.4	50.6
Oslo	236	57.3	42.7
Reykjavik	306	54.8	45.2
Riga	345	53.5	46.4
Sofia	357	54.9	45.1
Vilnius	311	52.7	47.3
Total	3000		

### Measures and design

The data is from the 2008 Youth in Europe Survey. The students answered a questionnaire that was developed by ICSRA at Reykjavik University and colleagues in the University of Iceland (see Kristjansson (2008) for a full discussion). It was the same in all participating cities. Along with questions on delinquency and substance use, the questions covered a wide array of demographic and social variables, including peer support and family structure.

The dependent variables were questions about depression and anxiety, body-image and self-esteem. Participants were asked in general if they engage in any form of physical training or sport. They had six options to choose from: 1=Almost never, 2=Once a week, 3=Twice a week, 4=3 times a week, 5= 4-6 times a week and 6=Almost every day. They were also asked more specifically about their sports and aerobic activities they engage in and could the participants mark with the same options as before. The questions were a) How often do you participate in sports and physical training in school, outside the compulsory classes (Phys. Ed. Class)? b) How often do you engage in sports (practice or compete) in a sports club/team? c) How often do you exercise or practice sports, outside school and outside a club/team? d) How often do you exert yourself physically so you exhaust yourself or sweat? These questions (a, b, c, d) were put together into one variable called specific exercise. The reliability, as measured with the internal consistency coefficient Cronbach's Alpha, was high (.812).

Depression and anxiety were measured by 15 items defined by Derogatis, Lipman and Covi (1973). The participants were asked how often they feel mental or physical discomforts in the past week. These items were a) Nervousness, b) Sudden fear for no apparent reason, c) I felt tense, d) I was sad or had little interest in doing things, e) I had little appetite, f) I felt lonely, g) I cried easily or wanted to cry, h) I had sleeping problems, i) I felt sad or blue, j) I



was not excited in doing things, k) I was slow or had little energy, l) The future seemed hopeless, m) I thought of committing suicide, n) I felt that everyone had let me down, o) I had no one to talk to. Participants had four options to choose from: 1=Almost never, 2=Seldom, 3=Sometimes, 4=Often. The reliability was high, Cronbach's Alpha=.908.

Body-image was measured with a seven item scale from the Offer and Howard (1972), or the Self-Image Questionnaire for Adolescents. Participants were asked how well the following statements applied to them: a) When I think about how I will look in the future, I am pleased, b) I most often think that I am ugly and unattractive, c) I am happy with my body, d) I am happy with the physical changes that have taken place in my body during the past few years, e) I feel physically strong and healthy, f) I am content with my life, g) I am happy. Participants had four options to choose from: 1=Very well, 2=Rather well, 3=Rather poorly, 4=Not at all. The reliability, as measured as before, was high with Cronbach's Alpha=.784.

Self-esteem was measured with the Rosenberg (1965) Self-Esteem Scale. It includes 10 items about feelings of self-worth, capability and beliefs. Participants were asked how well the following statements applied to them: a) I feel that I am worth at least as much as others, b) I feel that I have number of good qualities, c) All in all I am inclined to feel that I am a failure, d) I am able to do things as well as most other people, e) I feel I do not have much to be proud of, f) I take a positive attitude towards myself, g) On the whole I am satisfied with myself, h) I wish I had more respect for myself, i) At times I think that I am no good at all, j) I certainly feel useless at times. Participants had four options to choose from: 1=Applies very well to me, 2=Applies rather well to me, 3=Applies rather poorly to me, 4=Applies very poorly to me. The reliability was high, with Cronbach's Alpha=.781.

### **Procedure**

In the Youth in Europe study, data collection in classes was supervised by teachers. They were guided by a strictly uniform methodological protocol developed by the ICSRA

(see Sigfusdottir, Kristjansson, & Agnew (2011) for a full discussion). School authorities in each city approved of this study and each participant had every right to deny participation.

Research data was analysed using IBM-SPSS, version 20. Descriptive statistics were examined for general training, specific exercise, depression and anxiety, body-image and self-esteem. Mean and standard deviations were calculated for the two independent variables and the three dependent variables. Linear regression was used to see if the independent variables predicted for the values of the dependent variables. To find out if there was a difference between physical activity and mental health between the cities, analysis of variance (ANOVA) was used. The assumption of no multicollinearity was met as the tolerance was well above .200, or .488 for both predictors.

### **Results**

Table 2 shows the number of participants, level of mean and standard deviation for general training, specific exercise, depression and anxiety, body-image and self-esteem for the eleven cities that participated in the 2008 Youth in Europe study. It shows that the mean level of general training was highest in Jurmala. In contrast, the mean level of specific exercise was highest in Oslo which was also high in general training. Mean level of depression and anxiety were highest in Bucharest but participants from Arilje have the most negative body-image. However, only 75 participants came from Arilje. Participants from Klaipeda and Vilnius had the most positive level of self-esteem but participants from Bucharest had the worst.

The correlation was measured between the independent variables (general training and specific exercise) and the dependent variables (depression and anxiety, body-image and self-esteem). The correlation between general training and depression and anxiety was  $-.49$ , it was  $-.33$  between general training and body image and  $.22$  between general training and self-esteem. In contrast, the correlation was  $-.80$  between specific exercise and depression and

anxiety. The correlation between specific exercise and body-image was .42 for body-image and .51 between specific exercise and self-esteem.

Table 2

*Descriptive Statistics Showing Number of Participants in each City, Mean Levels and Standard Deviation for General Training, Specific Exercise, Depression and Anxiety, Body-Image and Self-Esteem*

	General Training			Specific Exercise			Depression and Anxiety			Body-image			Self-esteem		
	N	M	SD	N	M	SD	N	M	SD	N	M	SD	N	M	SD
Arilje	80	3.1	1.8	79	3.1	1.6	73	1.8	.59	75	3.3	.48	78	3.2	.46
Bucharest	334	3.3	1.7	333	2.4	1.4	313	2.2	.59	337	3.1	.57	325	3.2	.50
Istanbul	296	2.5	1.6	294	1.9	1.3	310	2.1	.78	321	3.0	.62	305	3.0	.49
Jurmala	73	4.0	1.2	69	2.5	1.4	70	1.9	.59	73	2.9	.58	72	3.0	.47
Kaunas	344	2.9	1.7	340	2.3	1.2	345	1.9	.59	351	3.1	.54	352	3.0	.46
Klaipeda	239	3.1	1.7	241	2.4	1.2	242	2.0	.57	246	3.0	.53	242	2.9	.42
Oslo	219	3.7	1.6	213	3.0	1.2	219	1.7	.63	222	3.0	.62	209	3.1	.59
Reykjavik	293	3.8	1.6	283	2.9	1.3	283	1.6	.58	289	3.1	.57	281	3.2	.61
Riga	335	3.9	1.5	332	2.7	1.4	337	1.9	.56	334	3.0	.58	328	3.1	.51
Sofia	342	3.4	1.8	342	2.7	1.6	341	1.9	.68	346	3.2	.61	332	3.0	.51
Vilnius	305	2.9	1.6	303	2.2	1.1	300	2.0	.58	308	3.0	.51	306	2.9	.47

As can be seen in table 3, the mean level for body-image and self-esteem were exactly the same. It also shows the mean level was much higher where participants were asked about their general training rather than specific exercise.

Table 3

*Overall Number of Participants, Mean and Standard Deviation for each Variable*

Variables	N	M	SD	Min	Max
General Training	2860	3.3	1.7	1	6
Specific Exercise	2829	2.5	1.4	1	6
Depression and Anxiety	2833	1.9	.64	1	4
Body-Image	2902	3.1	.57	1	4
Self-Esteem	2830	3.1	.51	1	4

Table 4 shows regression analysis for the dependent variables, depression and anxiety, body-image and self-esteem for each city. The physical predictors (general training and specific exercise) explained 6.2% of the variance in depression and anxiety,  $R^2 = .062$ ,  $F(2, 2707) = 89.20$ ,  $p < .001$  in the total sample. Beta for physical activity (general training or specific exercise) on depression and anxiety was significant ( $p < .05$ ) in Bucharest, Istanbul, Riga, Sofia and Vilnius.  $R^2$  was highest in Sofia, where physical activity explained 9% of the variance in depression and anxiety.

In body-image, the physical predictors explained 6.1% of the variance in the total sample,  $R^2 = .061$ ,  $F(2, 2757) = 90.25$ ,  $p < .001$ . In eight cities (Arlje, Bucharest, Jurmala, Kaunas, Reykjavik, Riga, Sofia and Vilnius) physical activity (general training or specific exercise) had a significant effect ( $p < .05$ ) on body-image, as can be seen in table 4. In Reykjavik, both the independent variables had a significant effect on body-image. There, physical activity explained 18% of the variance in body-image which was a much higher ratio than in the other cities. In contrast,  $R^2$  explained around 10% of the variance in body-image in Kaunas, Riga and Vilnius.

The physical predictors explained 3.2% of the variance in self-esteem in the total sample,  $R^2 = .032$ ,  $F(2, 2717) = 44.30$ ,  $p < .001$ . Looking at table 4, physical activity (general training or specific exercise) had an effect in two cities (Istanbul and Oslo) on self-esteem.  $R^2$

was highest in Oslo and Reykjavik. In those two cities, physical activity explained 8% in Oslo and 9% in Reykjavik of the variance in self-esteem.

Table 4

*Regression Analysis with Depression and Anxiety, Body-Image and Self-Esteem as Dependent Variables and Predictors*

Depression and anxiety		Body-image		Self-esteem	
	$\beta$	R <sup>2</sup>	$\beta$	R <sup>2</sup>	
Arilje		.04		.11*	.04
-General Training	.22		-.27		-.27
-Specific Exercise	-.32		.47**		.31
Bucharest		.06***		.05***	.02
-General Training	-.08		.04		.07
-Specific Training	-.18*		.19*		.07
Istanbul		.03*		.01	.02*
-General Training	-.22**		.07		.18*
-Specific Exercise	.09		-.00		-.06
Jurmala		.07		.13*	.02
-General Training	-.18		-.02		-.11
-Specific Exercise	-.12		.38*		.17
Kaunas		.03**		.10***	.02*
-General Training	-.12		.06		.03
-Specific Exercise	-.07		.27**		.13
Klaipeda		.08***		.05**	.02
-General Training	-.15		.15		.14
-Specific Exercise	-.15		.10		-.02
Oslo		.07**		.07**	.08***
-General Training	-.20		.20		.29**
-Specific Exercise	-.08		.07		-.02
Reykjavik		.07***		.18***	.09***
-General Training	-.14		.26**		.18
-Specific Exercise	-.14		.19*		.14
Riga		.05***		.10***	.02
-General Training	-.18*		.18*		.08
-Specific Exercise	-.06		.16*		.05
Sofia		.09***		.06***	.05***
-General Training	-.29***		.04		.15
-Specific Exercise	-.02		.21**		.10
Vilnius		.06***		.10***	.02
-General Training	-.24**		.24**		.15
-Specific Exercise	.00		.10		-.03

Note. \* p < .05. \*\* p < .01. \*\*\* p < .001.

As can be seen in table 5, general training in eleven cities was compared. Significant difference ( $p < .01$ ) was found between Arilje and Riga. Participants in Riga clearly exercise more than participants in Arilje. There was also difference between Bucharest and three cities (Istanbul, Reykjavik and Riga). Significant difference was noticeable between Istanbul and all of the cities except Vilnius. Participants in Istanbul exercise less than participants in these cities.

Table 5

*Mean Difference When Comparing General Training Between Cities*

	Arilje	Bucharest	Istanbul	Jurmala	Kaunas	Klaipeda	Oslo	Reykjavik	Riga	Sofia
Arilje										
Bucharest	-.2									
Istanbul	.6	.8***								
Jurmala	-.9	-.7	-1.5***							
Kaunas	.2	.4	-.5*	1.0***						
Klaipeda	-.3	.2	-.6***	.8**	.2					
Oslo	-.7	-.4	-1.3***	.2	-.8***	-.6**				
Reykjavik	-.7	-.5*	-1.3***	.2	-.9***	-.7***	-.0			
Riga	-.8**	-.6***	-1.4***	.1	-1.0***	-.8***	-.2	-.1		
Sofia	-.3	-.1	-.9***	.6	-.4*	-.3	.4	.4	.5**	
Vilnius	-.2	.4	-.4	1.1***	.0	.2	.8***	.9***	1.0***	.5*

*Note.* Minus means the city in the top row has lower level than the city in the column at the left. \*  $p < .05$ . \*\*  $p < .01$ . \*\*\*  $p < .001$ .

Looking at table 6, one can see that Arilje is significantly different from Bucharest, Istanbul, Kaunas, Klaipeda and Vilnius when comparing specific exercise between cities. Participants in Arilje exercise more specifically than participants in these five cities. Significant difference was also noticeable between Istanbul and all the cities except Vilnius. Participants in Istanbul are therefore exercising less specifically than participants in these cities.

Table 6

*Mean Difference When Comparing Specific Exercise Between Cities*

	Arilje	Bucha- rest	Istan- bul	Jurmala	Kaunas	Klai- peda	Oslo	Reykja- vik	Riga	Sofia
Arilje										
Bucharest	.7**									
Istanbul	1.2***	.5**								
Jurmala	.6	-.2	-.6*							
Kaunas	.8***	.1	.4*	.2						
Klaipeda	.7**	.0	-.5**	.2	-.1					
Oslo	.1	-.7***	-1.1***	-.5	-.7***	-.6***				
Reykjavik	.2	-.5***	-1.0***	-.4	-.6***	-.5***	.1			
Riga	.4	-.3	-.8***	-.2	-.4**	-.3	.3	.2		
Sofia	.4	-.3	-.8***	-.2	-.4**	-.3	.3	.2	-.0	
Vilnius	.8***	.1	-.3	.3	.0	.1	.8***	.7***	.4**	.5**

*Note.* Minus means the city in the top row has lower level than the city in the column at the left. \*  $p < .05$ . \*\*  $p < .01$ . \*\*\*  $p < .001$ .

Table 7 shows mean difference between the eleven cities when looking at depression and anxiety. There was a significant difference between Bucharest and eight cities. There was also a significant difference between Istanbul and five cities. Participants in Bucharest and Istanbul had higher level of mean than most of the other cities when it comes to depression and anxiety and Reykjavik had the lowest mean.

Table 7

*Mean Difference When Comparing Depression and Anxiety Between Cities*

	Arilje	Bucha- rest	Istan- bul	Jurmala	Kaunas	Klai- peda	Oslo	Reykja- vik	Riga	Sofia
Arilje										
Bucharest	-.4**									
Istanbul	-.3*	.1								
Jurmala	-.1	.2	.1							
Kaunas	-.1	.3***	.2*	.0						
Klaipeda	-.2	.2*	.1	-.1	-.1					
Oslo	.1	.5***	.4***	.3	.2**	.3***				
Reykjavik	.2	.5***	.4***	.3*	.3***	.3***	.1			
Riga	-.1	.3***	.2*	.0	-.0	.1	-.2**	-.3***		
Sofia	-.1	.3***	.2	.0	-.0	.1	-.2**	-.3***	-.0	
Vilnius	-.2	.2**	.1	-.0	-.1	.0	-.3***	-.3***	-.1	-.0

*Note.* Minus means the city in the top row has lower level than the city in the column at the left. \*  $p < .05$ . \*\*  $p < .01$ . \*\*\*  $p < .001$ .

In table 8, mean difference was compared between the eleven cities when looking at body-image. There was a significant difference between Arilje and all the cities except Sofia. Participants in Arilje look more negatively to their body-image than participants in the other cities.



Table 8

*Mean Difference When Comparing Body-Image Between Cities*

	Arilje	Bucha- rest	Istan- bul	Jurmala	Kaunas	Klai- peda	Oslo	Reykja- vik	Riga	Sofia
Arilje										
Bucharest	.3*									
Istanbul	.3**	.0								
Jurmala	.4**	.1	.1							
Kaunas	.3*	-.0	-.0	-.1						
Klaipeda	.3**	.1	.0	-.1	.1					
Oslo	.3**	.1	.0	-.1	.1	.0				
Reykjavik	.3*	.0	-.0	-.1	.0	-.1	-.1			
Riga	.3***	.1	.1	-.1	.1	.0	.0	.1		
Sofia	.2	-.1	-.1	-.2	-.1	-.2*	-.2	-.1	-.2**	
Vilnius	.3**	.0	.0	-.1	.0	-.0	-.0	.0	-.0	.1

*Note.* Minus means the city in the top row has lower level than the city in the column at the left. \*  $p < .05$ . \*\*  $p < .01$ . \*\*\*  $p < .001$ .

Finally, table 9 shows mean difference when self-esteem is compared between the eleven cities. There was a significant difference between Bucharest and seven cities (Istanbul, Jurmala, Kaunas, Klaipeda, Riga, Sofia, and Vilnius). Therefore, participants from Bucharest have lower self-esteem than the participants from these cities.

Table 9

*Mean Difference When Comparing Self-Esteem Between Cities*

	Arilje	Bucha- rest	Istan- bul	Jurmala	Kaunas	Klai- peda	Oslo	Reykja- vik	Riga	Sofia
Arilje										
Bucharest	-.0									
Istanbul	.2	.2***								
Jurmala	.2	.3**	.1							
Kaunas	.2*	.2***	.1	-.0						
Klaipeda	.3***	.3***	.1	.1	.1					
Oslo	.1	.1	-.1	-.2	-.1	-.2**				
Reykjavik	.0	.0	-.1	-.2	-.2***	-.3***	-.1			
Riga	.1	.1*	-.0	-.1	-.1	-.2**	.0	.1		
Sofia	.2	.2***	.0	-.1	-.0	-.1	.1	.2*	.1	
Vilnius	.3**	.3***	.1	.0	.1	-.0	.2**	.3***	.2*	.1

*Note.* Minus means the city in the top row has lower level than the city in the column at the left. \*  $p < .05$ . \*\*  $p < .01$ . \*\*\*  $p < .001$ .

### Discussion

The aim of this study was twofold. To explore whether physical activity predicts depression and anxiety, body-image and self-esteem and to explore whether levels of physical activity and depression and anxiety, body-image and self-esteem is similar across 11 cities in Europe. Partial support was found for the first hypothesis. In some cities, physical activity predicted depression and anxiety, body-image and self-esteem but not in others. Again, partial support was found for the second hypothesis. The levels of physical activity, depression and anxiety, body-image and self-esteem were similar between the cities. However, different levels of physical activity were observed between numerous cities and also the levels of depression and anxiety, body-image and self-esteem.

When looking at depression and anxiety, it showed that physical activity predicted in five cities that it had an effect on depression and anxiety compared to eight cities when looking at body-image. Physical activity had an effect on self-esteem in only two cities. The

prediction was best in Bucharest, Riga, Sofia and Vilnius where physical activity had an effect on both depression and anxiety and on body-image. The level of general training was different between most of the cities but some of them were similar. The lowest level of mean in general training was in Istanbul. Significant difference was noticeable between Istanbul and all the other cities except Vilnius.

In specific exercise where participants were asked more specifically about their level of physical training it showed that significant difference was between Istanbul and all the cities except Vilnius. Like in general training, the mean level of specific exercise was lowest in Istanbul. There was also significant difference between Arilje and five other cities but much fewer participants came from Arilje which could have an effect.

The mean difference between the cities in terms of depression and anxiety showed that significant difference was between Bucharest and eight cities, compared to four cities when Istanbul was looked at. Descriptive statistics showed that the level of mean for depression and anxiety was highest in Bucharest and Istanbul. The level of mean for body-image was similar in many cities but participants from Arilje had the worst body-image and participants from Riga had the best. What was interesting when body-image was compared between the cities, was that significant difference was between Arilje and all the other cities except Sofia. Again, participants from Arilje were much fewer so that could be an important factor. The only other significant difference was found between Riga and Sofia.

The mean levels of self-esteem were worst in Bucharest, Arilje and Reykjavik. The results also showed that significant difference was between Bucharest and seven cities compared to only three cities when Arilje was looked at. When Reykjavik was examined the results showed significant difference between it and four cities. Culture and religion are very different in Reykjavik from these two cities so that could be an important factor.

In conclusion, the findings indicate that physical activity appears to have an effect in some of the cities but why and how is debatable. The data in this study is strong because it is a big representative national sample. It is based on answers from students, both male and female from 11 cities. These cities have different culture, religion and social environment so the sample is very reliable. However, self reporting bias can not be ruled out and it is also impossible to conclude on causal relations. Finally, many studies have explored the relation between physical activity and depression and anxiety but not as much on body-image and self-esteem. Further studies on these topics is therefore highly recommended.

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