Effect of a 12-week Exercise Intervention on Anxiety and Depressive Symptoms Among Community Dwelling Older Adults

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Abstract

Evidence suggests that regular physical activity can be an effective treatment for people with symptoms of high anxiety and depression. The aim of this study was to examine the effect of a 12-week exercise intervention on anxiety and depressive symptoms among community-dwelling older adults from Reykjavík, Iceland. The participants were 27 (17 female, 10 male) older adults (mean age of 77.85±7.55). The main outcome included anxiety (GAD-7) and depressive symptoms (PHQ-9), measured before and after the 12-week exercise intervention. The exercise program consisted of a total of 24 exercise classes (40 minutes of low intensity aerobic/resistance training). An independent t-test, a paired samples t-test and a mixed two-way ANOVA were used to examine the changes in anxiety and depressive symptoms.

At baseline there was no difference in anxiety and depressive symptoms between the exercise group and control group. After the intervention period, neither group showed any significant change in the level of anxiety and depressive symptoms ($p > 0.05$). The study is limited by a small sample size and high attrition rate. In the current study, we were not able to support the effectiveness of an exercise intervention for reduction of anxiety and depressive symptoms among older adults.

Útdráttur

Gögn hafa rennt stoðum undir gagnsemi reglulegrar líkamlegrar hreyfingar sem meðferðarúrræðis fyrir fólk sem sýnir einkenni mikils kvíða og þunglyndis. Markmið þessarar rannsóknar var að kanna áhrif líkamsræktar um 12 vikna skeið á kvíða- og þunglyndiseinkenni íbúa dvalarheimilis fyrir aldraða í Reykjavík. Þátttakendur voru 27 (17 konur og 10 karlar) aldraðir einstaklingar (meðalaldur 77,85±7,55 ár). Meðal helstu niðurstaðna voru mælingar á einkennum kvíða (GAD-7) og þunglyndis (PHQ-9) sem framkvæmdar voru fyrir 12 vikna æfingatímabilið annars vegar og að því loknu hins vegar. Æfingaáætlunin samanstóð af 24 tímum (hver og einn 40 mínútur af tiltölulega einfaldri þolþjálfun). Notast var við óháð t-próf, parað t-próf og blandað tvíhliða ANOVA-próf til að rannsaka breytingar á einkennum kvíða og þunglyndis. Við grunnlínukönnun var munur á kvíða- og þunglyndiseinkennum æfingahópsins og samanburðarhópsins enginn. Að æfingatímabilinu loknu sýndi hvorugur hópurinn marktæka breytingu á einkennum kvíða og þunglyndis ($p > 0,05$). Rannsóknin takmarkast af litlu úrtaki og miklu brottfalli. Okkur var með rannsókninni ekki unnt að styðja kenninguna um gagnsemi íhlutunar með líkamsrækt þegar kemur að því draga úr einkennum kvíða og þunglyndis meðal aldraðra.

Effect of a 12-Week Exercise Intervention on Anxiety and Depressive Symptoms Among Community Dwelling Older Adults

In the last decade life expectancy at birth has increased while at the same time birth rate has contracted. Due to this, individuals aged 65 years and older are becoming a larger proportion of our community. In 2010 people aged 65 years or older were 524 million, and this number is expected to triple by the year 2050. It is predicted that in about five years the elderly will have outnumbered children under five years of age. Bridging our knowledge gap regarding the health and mental well-being of the elderly is therefore more important than ever before (WHO, 2011).

According to the World Health Organization (WHO, 2012), depression is a worldwide problem. It is a main cause of disability and contributes greatly to the burden of global disease (WHO, 2012). Research has shown that having Major Depression Disorder (MDD) is a risk factor for mortality and those diagnosed with MDD show an increased probability of death by 59% (Rovner et al., 1991). Anxiety disorders and depression tend to co-occur (Kvaal, McDougall, Brayne, Matthews, & Dewey, 2008) and are the most common mental health disorders among younger adults (Kessler et al., 1994). This continues to be a prevalent problem into old age and the rate of MDD among the elderly varies between 12.6% and 16.9% (Davison et al., 2007; Rovner et al., 1991; Wild et al., 2012) and between 10.0% and 17.1% for anxiety (Beekman et al., 1998; Kirmizioglu, Doğan, Kuğu, & Akyüz, 2009; Manela, Katona, & Livingston, 1996). This affects the psychological and social quality of life in a negative manner (Kvaal et al., 2008). Subsequently, coming up with cost-effective ways for the elderly to maintain their good health and well-being while living a fulfilling and meaningful life has become imperative (WHO, 2011).

Research has shown that people who are physically active enjoy better mental health in general and there are some indicators that this might be a dose-response relationship (Abu-Omar, Rütten, & Lehtinen, 2004). Older adults who are physically active show fewer symptoms of depression and disability compared to those who are inactive and exercise serves as a moderator in this relationship (Lee & Park, 2008). Exercise has also been shown to have a positive effect on the reduction of anxiety and depressive symptoms among the elderly (Blumenthal et al., 1999; Katula, Blissmer, & McAuley, 1999; Motl et al., 2005).

Blumenthal et al. (1999) reported finding a reduction in depressive symptoms after an exercise intervention among clinically depressed older adults. The aim of the study was to compare the reduction of depressive symptoms resulting from exercise, antidepressant medication and a mixed condition of the two, among participants. Results showed that all conditions reduced depressive symptoms among participants with reduction ranging from 60.4% to 68.8%. Despite participants receiving the antidepressants having shown the fastest initial response, no difference was found between the groups at the end of the 16-week intervention (Blumenthal et al., 1999). Furthermore, at a ten month follow-up, the exercise group showed significantly lower relapse rates compared to participants in the medication group, indicating that exercise might be just as effective as antidepressant medication in treating depression (Babyak et al., 2000). Positive results have also been observed among adults without MDD diagnosis. Motl et al. (2005) reported findings of exercise having positive effect on the psychological well-being of a group of sedentary adults. Comparing cardiorespiratory exercise to flexibility and strength training showed that both groups had a reduction in depressive symptoms and that the change was predicted by a change in physical self-esteem. These benefits were long-term effects sustained through follow-ups at 12 and 60 months (Motl et al., 2005).

Despite the fact that anxiety and depression tend to co-occur (Kvaal et al., 2008), to the author's best knowledge, limited research has been conducted on the effect of exercise on the reduction on anxiety symptoms among the elderly. However, more research has been done on younger people, and the results are promising. After Broman-Fulks and Storey (2008) had shown that exercise reduces anxiety sensitivity among college students, Smits et al. (2008) conducted a research to examine whether reduction in anxiety sensitivity moderated reduction in anxiety and depressed mood levels. The results showed that this seems to be the case. Anxiety sensitivity was shown to have an effect on reduction in anxiety and depressed mood levels. The reduction in anxiety sensitivity occurred before the change in anxiety and depressed mood levels and seemed to serve as a mediator (Smits et al., 2008). Research has shown that light exercise can also work to reduce anxiety symptoms among the elderly (Katula et al., 1999). However, moderate exercise did not show a reduction in anxiety symptoms and a maximum intensity exercise program in turn increased anxiety among the elderly. This increase could be due to increased stimulation caused by the exercise program or it can imply that training too hard can trigger anxiety instead of relieving it (Katula et al., 1999).

Depression and anxiety are very real problems among the elderly and can have detrimental effects on their life (Rovner et al., 1991). Antidepressants have been shown to have approximately 50% remission rates among the depressed with comorbid anxiety disorder, unrelated to age (Cassano, Soares, Cohen, Lyster, & Fava, 2004). Research has shown that Cognitive Behavioral Therapy can be just as effective as medication (Antonuccio, Danton, & DeNelsky, 1995) but these two methods combined do not seem to boost one another (Oei & Yeoh, 1999). Many patients are therefore not getting better and other forms of treatment are needed. Exercise has showed promising results for these disorders and the aim

of the current study is to investigate the effect of exercise on anxiety and depressive symptoms among older adults. The aim is to compare the reduction in anxiety and depressive symptoms between an exercise group and a control group in a 12-week intervention study.

We hypothesize that (1) people in both the exercise group and the control group will have similar levels of anxiety and depressive symptoms, (2) people who participated in the exercise class will exhibit lower levels of anxiety and depressive symptoms after 12 weeks of exercise intervention, (3) people who did not participate in the exercise class will not show any improvements when it comes to anxiety and depressive symptoms and (4) people who participated in the exercise class will have an improved level of anxiety and depressive symptoms compared to people who did not participate in the exercise class.

Method

Participants

Exercise class.

The participants were Icelandic community-dwelling older adults. They responded to an advertisement for a free exercise class which included participating in a research program. Participation was voluntary and available for those who wanted. Fifty three people started the intervention program and 29 people completed the program.

Control group.

Participants in the control group were approached in the cafeteria at their facility and asked if they wanted to participate in an exercise study. People were invited to participate in the exercise class or as a part of a control group. None of the participants approached had an interest in being a part of the exercise group and 14 individuals agreed to participation.

Procedure

The study was approved by the Icelandic National Bioethics Committee (VSN14003). Informed consent was obtained from all participants and their right to withdraw their participations with no questions asked emphasized (see appendix A for the control group and appendix B for the exercise group). All participants received a letter debriefing them of the results of the study (see appendix C).

The 12 week Exercise Intervention.

Participants in the exercise class were recruited through an advertisement. The exercise class was free of charge and participants were not compensated. An exercise class was given two times per week. Each exercise class lasted 40 minutes and consisted of mixed exercises for both strength and cardiovascular training. There were mild strengthening exercises, stability exercises and aerobic exercises. At the beginning of the program the systolic and diastolic blood pressure, weight, height, pulse, fat percentage, waist and hip were measured. Ten days into the program a decision was made to add a questionnaire to measure anxiety and depressive symptoms. The depression and anxiety measurements were performed on as many participants as possible on a single day to not let too much time pass into the program. Because many of the participants were of very old age and couldn't see very well, the depression and anxiety questionnaires were read for them out loud in a private setting. The answers were, however, decided on by the participants alone and the interviewer tried not to influence the participants' answers in any way. Post-measurements, physical and psychological, were all performed on the same day after the 12-week intervention program.

Control group.

The control group was only intended for comparison for depression and anxiety symptoms. Therefore, the control group was only measured on depressive and anxiety

symptoms and no physical measurements were performed. The questionnaires were administered in the same manner as for the intervention group, ten days after the exercise program started, on two consecutive days. For the post-measurements, an appointment was made with each individual within the same week.

Study design and Data analysis

The study was an intervention study with pre- and post-measurements. Data analysis was performed using the statistical software SPSS. The data was analyzed with a 2 x 2 mixed ANOVA, an independent t-test, and a paired samples t-test. As the main goal was to measure the difference in anxiety and depressive symptoms, participants were excluded if they did not have both the pre- and post-measurements for the anxiety and depression measurements.

Measures

Physical measurements.

The participants' body weight was measured in light underwear on a calibrated scale (Body fat analysis scale, model PW 4916 FA, AEG, Germany). The height was measured with a calibrated stadiometer (model no. 206; Seca). Height and weight (kg/m^2) were used for calculating the body mass index (BMI). An OMRON fat measuring device was used to assess fat percentage (model HBF-306c, OMRON fat loss monitor, USA). The circumference of the waist was measured halfway between the top of the lateral iliac crest and the lowest rib. All measurements were performed twice, using a tape measure and recorded to the nearest centimeter. Blood pressure (BP) was measured in a semi-recumbent position with an appropriately sized cuff on the right arm, using an Omron HEM-712C Automatic Blood Pressure Monitor, after participants had rested for several minutes.

Psychological measurements.

GAD-7

The GAD-7 is a self-report questionnaire consisting of seven items and is intended for screening and measuring severity of generalized anxiety disorder. The items ask about symptoms over the preceding two weeks with the response categories “not at all”, “several days”, “more than half of the days”, and “nearly everyday” (see appendix D for the complete questionnaire). Assessment is indicated by the total score that ranges from zero to twenty one. The cut-off points for mild, moderate and severe anxiety are scores of five, ten and fifteen points (Spitzer, Kroenke, Williams, & Löwe, 2006).

PHQ-9

The PHQ-9 is a self-report questionnaire consisting of nine items and is designed to evaluate the presence of depressive symptoms over the preceding two weeks. It is intended for screening purposes and can serve as a severity measure. Each of the nine items scores one of the nine DSM-IV criteria and has the response categories “not at all”, “several days”, “more than half of the days”, and “nearly everyday” (see appendix E for the complete questionnaire). Assessment is indicated by the total score that ranges from zero to twenty seven. Scores of nine, fifteen and twenty points are taken as cut-off points for minor, moderate and severe depression (Kroenke, Spitzer, & Williams, 2001).

Results

Participants

Participants were excluded if they did not have pre- and post-measurements on the anxiety and depression questionnaires. This resulted in an exercise group of 13 participants and a control group of 14 participants. In table 1 the physical and psychological measurements for the exercise group are displayed. After the 12-week exercise intervention

program, men showed a significantly increased fat percentage ($p < 0.05$) and women significantly reduced their waistline ($p < 0.05$). The control group did not have any physical measurements and table 2 shows the mean score for the psychological measurements.

Table 1

Mean (SD) Measurements for the Intervention Group at Pre and Post Levels

	Men			Women		
	N	Pre	Post	N	Pre	Post
Age, mean (SD), y	4	74.74(2.99)		8	74.22 (7.51)	
BMI, mean (SD), kg/m^2	4	27.68 (2.69)	27.56 (2.38)	8	25.96 (1.62)	28.26 (4.59)
Waist, mean (SD), cm	4	104.94 (8.67)	103.00 (7.53)	5	91.27 (7.56)*	89.75 (7.29)*
Hips, mean(SD), cm	4	104.66 (5.18)	104.50 (6.03)	5	103.99 (7.76)	102.75 (5.70)
Fat percentage, mean	4	29.33 (2.40)*	31.67 (1.31)*	4	39.76 (2.69)	40.28 (1.96)
Systolic blood pressure	4	138.50 (19.42)	143.00 (18.02)	4	129.75 (29.94)	129.00 (22.72)
Diastolic blood pressure	4	70.25 (7.93)	68.00 (6.98)	5	82.50 (15.33)	75.50 (16.26)
Pulse, beats per minute	4	78.75(16.28)	77.00 (14.07)	5	72.00	76.50 (17.06)
Anxiety score[a]	4	1.25 (2.50)	1.75 (2.87)	9	1.00 (2.65)	1.33 (2.92)
Depression[b]	4	3.50 (4.35)	5.50 (6.13)	9	2.98 (8.58)	2.67 (3.16)

[a] Measured with the GAD-7, scores range from 0–21.

[b] Measured with the PHQ-9, scores range from 0–27.

*significant difference found between the pre- and post-measurement, $p < 0.05$.

Table 2

Mean (SD) Psychological Measurements for the Control Group

	Men (N = 6)		Women (N = 8)	
	Pre	Post	Pre	Post
Age, mean, y	82.33 (6.98)		80.13 (7.95)	
Anxiety[a]	1.83 (2.71)	2.00 (2.53)	1.88 (1.73)	2.00 (2.14)
Depression[b]	4.00 (2.09)	3.83 (3.55)	4.25 (3.62)	3.75 (3.24)

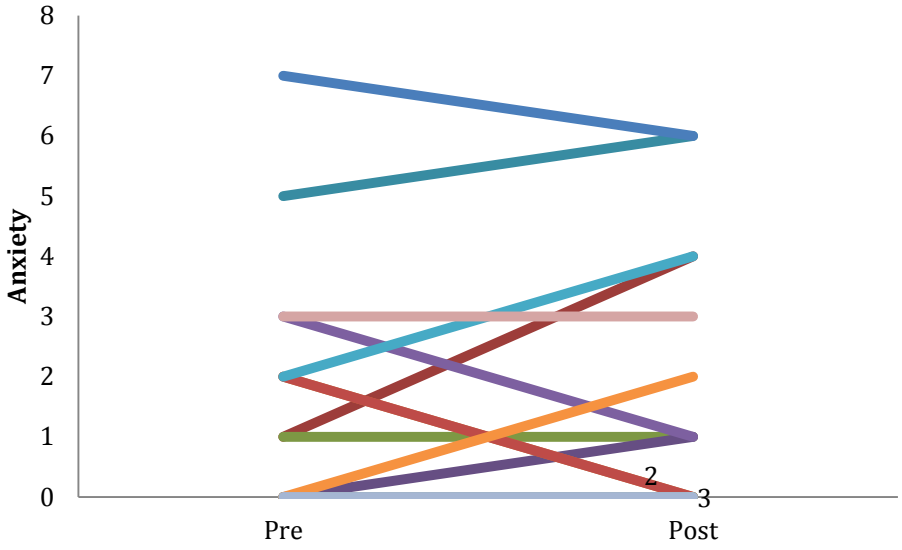
[a] Measured with the GAD-7, scores range from 0–21.

[b] Measured with the PHQ-9, scores range from 0–27.

Anxiety

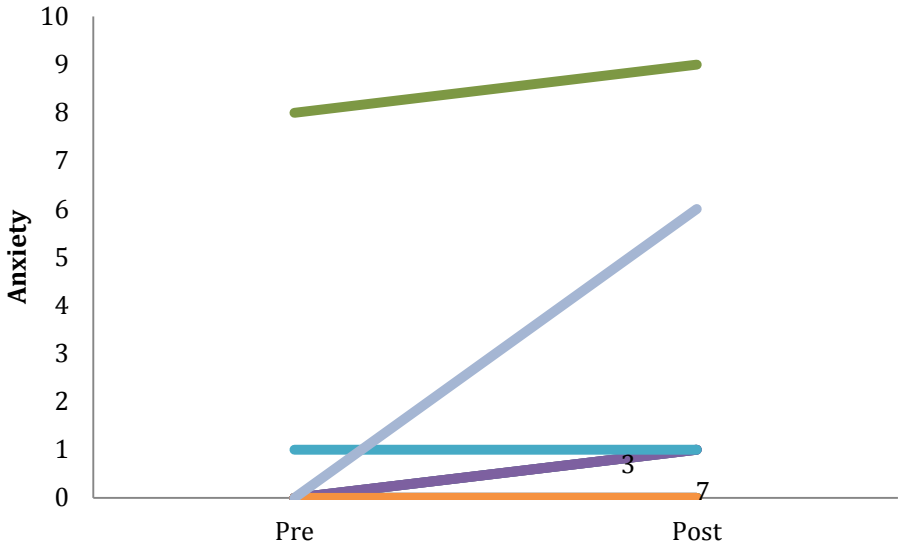
As hypothesized no significant difference was found between the control (mean (M) = 1.86, Standard Deviation (SD) = 2.11) and intervention group (M =1.08, SD = 2.50) at pre-score anxiety levels ($p = 0.388$). The second hypothesis was not supported, the intervention group did not exhibit a reduction in anxiety symptoms after 12 weeks of exercise. On the contrary, the pre-measurements (M = 1.08, SD = 2.50) were slightly lower than the post-measurements (M = 1.46, SD = 2.79), however significance was not reached ($p = 0.557$). The third hypothesis was supported, the control group did not change significantly between the pre-score (M = 1.86, SD = 2.11) and the post-score (M = 2.00, SD = 2.22), $p = 0.738$. There was no significant difference in the mean change in anxiety scores between the control (pre: M = 1.86, SD =2.11; post: M = 2.00, SD = 2.22) and exercise groups (pre: M = 1.08, SD = 2.50; post: M = 1.46, SD = 2.79), therefore not supporting our fourth hypothesis ($p = 0.444$).

In figures 1 and 2, the change in anxiety scores between the pre-score and the post-score is shown for the control and intervention groups per participant. The intervention group had fewer participants showing symptoms of anxiety than the control group, and the changes are not well distributed. The control group had five participants with the same score on both pre- and post-measurements, five participants had increased scores and four had reduced scores. The intervention group had eight participants showing the same scores between measurements, five participants had increased scores and none had reduced scores. Most participants in the intervention group stayed relatively stable over time compared to the participants in the control group, even though no significant change was found.



Note: Each line represents one participant unless otherwise indicated with a number.

Figure 1. Trend in anxiety scores among participants in the control group. No significant change was found ($p > 0.05$).



Note: Each line represents one participant unless otherwise indicated with a number.

Figure 2. Trend in anxiety scores among participants in the intervention group. No significant change was found ($p > 0.05$).

In table 3, the differences in anxiety scores per question are shown. The greatest gain in anxiety score for the intervention group was in question six, which refers to irritability and

being annoyed. The biggest reduction was in question five, which refers to being restless. For the control group the most gain was found in question three, which refers to worrying too much. The biggest reduction was in questions two and four, which refer to having trouble controlling your worries and having trouble relaxing.

Table 3

The Total Anxiety Score per Question (Q), for the Control and Intervention Groups at Pre and Post Levels

	Intervention group				Control group			
	Pre		Post		Pre		Post	
	N	Score	N	Score	N	Score	N	Score
Q 1[a]	*2*	2	2	*2*	4	6	3	7
Q 2[a]	*3*	3	3	*5*	5	7	3	5
Q 3[a]	*1*	3	2	*4*	4	6	4	9
Q 4[a]	*1*	1	1	*1*	2	2	0	0
Q 5[a]	*2*	4	1	*1*	0	0	1	1
Q 6[a]	*0*	0	3	*5*	3	3	3	3
Q 7[a]	*0*	0	0	*0*	2	2	1	3

[a] The questions can be seen in full in appendices D (Icelandic) and F (English).

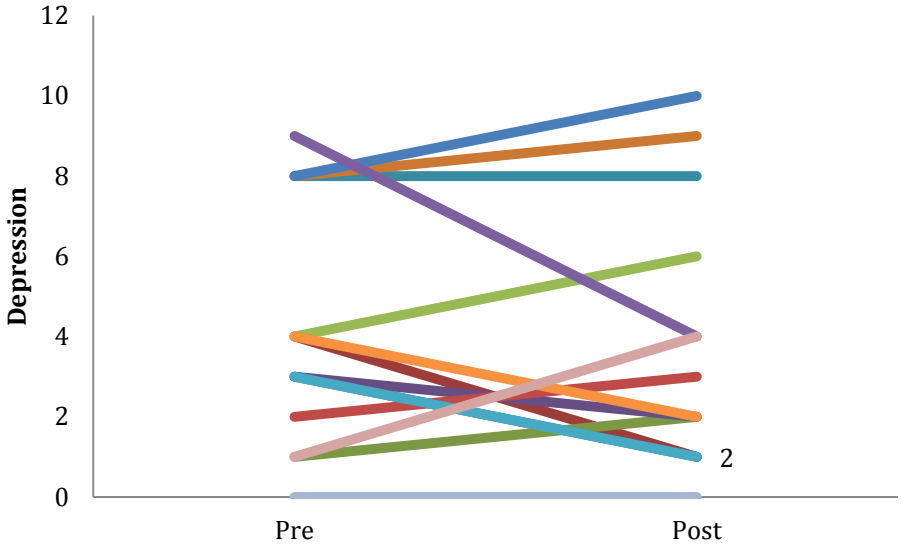
Depression

As hypothesized, no significant difference was found between the control (M = 4.14, SD = 2.96) and intervention groups (M = 3.14, SD = 7.33) at pre-score depression levels (p = 0.641). The second hypothesis was not supported; the intervention group did not show a reduction in depressive symptoms after 12 weeks of exercise. The pre-measurements (M = 2.54, SD = 5.38) were slightly lower than the post-measurements (M = 3.54, SD = 4.24), however significance was not reached (p = 0.808). The third hypothesis was supported, the control group did not change significantly between the pre-score (M = 4.14, SD = 2.96) and the post-score (M = 3.79, SD = 3.24), p = 0.561. Both the control and exercise groups had

relatively stable depression scores over time, showing a slight gain in the exercise group and a slight reduction in the control group. There was no significant difference in the mean change in depressive symptoms between the control (pre: M = 4.14, SD = 2.96; post: M = 3.79, SD = 3.24) and the exercise groups (pre: M = 2.54, SD = 5.38; post: M = 3.54, SD = 4.24), therefore not supporting the fourth hypothesis ($p = 0.702$).

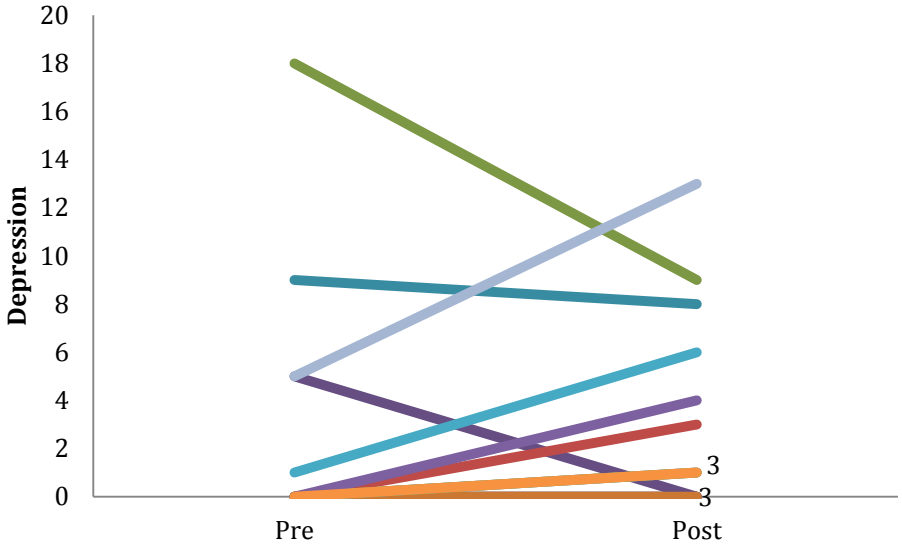
In figures 3 and 4, the change in depressive scores between the pre- and post-measures for the control and intervention groups are shown. There is no observable trend and participants in both groups are showing increased and decreased depression scores in equal amounts. The control group has two participants that show the same score between the pre- and post-measurements, six participants show an increased score and five participants show reduced scores. In the intervention group, three participants stay the same between measurements, three participants have reduced scores and seven participants show increased scores.

Even though no significant differences were found between the pre- and post-scores in depression, some change did occur. In table 4, the changes in scores per question are shown. For the intervention group, question number three—which assesses sleeping trouble—gains the most score. For the control group, this was question five—which asks about eating patterns. Both groups showed the biggest reduction in scores in question six, which asks about whether they have felt like a failure towards themselves or their family.



Note: Each line represents one participant unless otherwise indicated with a number.

Figure 3. Trend in depression scores among participants in the control group. No significant change was found ($p > 0.05$).



Note: Each line represents one participant unless otherwise indicated with a number.

Figure 4. Trend in depression scores among participants in the intervention group. No significant change was found ($p>0.05$).

Table 4

The Total Depression Score per Question (Q), for the Control and Intervention Groups, at Pre and Post Levels

	Intervention group				Control group			
	Pre		Post		Pre		Post	
	N	Score	N	Score	N	Score	N	Score
Q 1[a]	*2*	4	5	9	5	9	3	5
Q 2[a]	*1*	3	2	2	3	6	4	4
Q 3[a]	*2*	4	6	12	8	14	7	11
Q 4[a]	*3*	9	4	7	10	17	7	16
Q 5[a]	*1*	3	2	2	0	0	2	6
Q 6[a]	*3*	5	1	2	3	6	1	1
Q 7[a]	*1*	1	2	3	2	2	3	4
Q 8[a]	*1*	3	2	3	1	1	1	1
Q 9[a]	*1*	1	2	6	3	3	2	5

[a] The questions can be seen in full in appendix E (Icelandic) and G (English)

Discussion

The aim of the current study was to examine whether exercise has a reducing effect on anxiety and depressive symptoms among community-dwelling older adults of the Icelandic population. The findings do not support exercise reducing depressive and anxiety symptoms among the elderly. As hypothesized, the control group and intervention group did not differ on their pre-scores. However, the intervention group did not have reduced anxiety and depressive symptoms after the 12-week exercise program, and as hypothesized, nor did the control group. Therefore, the exercise group did not improve their anxiety and depressive symptoms after the exercise intervention and there was no difference in post-scores between the exercise group and the control group. The current finding is inconsistent with previous findings on depression (Blumenthal et al., 1999) and anxiety (Smits et al., 2008). This could be due to several reasons. First, research participants did not have to fulfill criteria for clinical

depression like in Blumenthal's research. The participants in the current research were mostly non-depressed or showing mild to moderate depressive symptoms with only one exception. The participant who had severe depressive symptoms at pre-measurement showed 50% reduction of depressive symptoms after the exercise intervention. It is possible that exercise is more effective for reducing severe depressive symptoms than moderate and mild symptoms. Second, Broman-Fulks and Storey's (2008) study on anxiety was performed on college students. This could indicate that exercise does not have the same effect on anxiety for the elderly as it does for the young age group. Katula's et al. (1999) study on anxiety was performed on the elderly and only found significance if the participants exercised mildly or moderately. As soon as they started exercising at their maximum performance level, their anxiety levels increased compared to baseline levels. It is possible that the current exercise intervention program was too strenuous for some of the participants, as the anxiety levels in the intervention group increased while it did not among participants in the control group. Third, there is evidence suggesting both anxiety and depressive symptoms are more noticeable from November through March, compared to other months of the year (Oyane, Bjelland, Pallesen, Holsten, & Bjorvatn, 2008). The present study had its pre-measurements in September and the post-measurements in December. The possibility therefore exists that seasonal changes played a role as to why no change was found in anxiety and depressive symptoms at the end of the exercise intervention as well as a slight increase being found. Fourth, participants in the intervention group willingly chose to participate, creating a selection bias. There might be some characteristics among those who decide to take part in an exercise study that affect the results. They might, for example, be exercising already or be of better mental health. Finally, the questionnaires are designed as self-report screening tools. In this case, the questionnaires were read out loud to the participants and filled out according to

each participant's responses. This was done as many of the participants had trouble reading due to poor eyesight. Whether this affects the results and validity of the questionnaires is unknown. Participants might be less willing to admit to anxiety and depressive symptoms when facing another person.

The results also showed that for the intervention group, increased scores when it comes to depression are primarily due to sleeping problems. Sleep disorders among the elderly are often associated with age and physical illness. For that reason, PHQ-9 might not be a feasible choice for measuring depressive symptoms, and changes therein, among the elderly.

The author speculates that Christmas being around the corner at the time of the post-measurements could also have had an effect. Christmas can be a busy and hectic time for people, thus triggering anxiety symptoms. Some might not have any family to celebrate the holidays with or not have the finances felt necessary to celebrate in their preferred manner. Christmas traditionally signifying a season of family gatherings, it is entirely possible that people missing their loved ones or being reminded of their loneliness at this time of the year could trigger symptoms of depression.

The research as it stands is not without its limitations. The attrition rate was substantial, resulting in a small-sized sample. Participants who quit the program are probably those who need it the most. Research has shown that baseline anxiety levels and life satisfaction are predictors of both dropout and treatment success (Herman et al., 2002). The participants were not randomly assigned to a control group or an exercise group, creating a selection bias which affects the generalizability of the results. The participants were not diagnosed with clinical depression and there was no criteria regarding other exercise programs prior or during the intervention program.

The role of exercise in treating anxiety and depression remains unclear. This research does not support that exercise can work as a treatment for depressive and anxiety symptoms. More research is needed to establish this, especially regarding anxiety, as it is a much understudied subject. In a future research it would be interesting to study only the clinically depressed and those diagnosed with anxiety. Stricter criteria would also be preferable; e.g., only selecting people with the same score or range of scores for anxiety or depressive symptoms, requiring that participants have not been exercising or using any medication for their disorders prior to or during the exercise intervention, as well as having a bigger sample size. Randomization would also be a good way to eliminate the selection bias. Comparing different age groups among the elderly could also be interesting, as there is a great difference between being in your early 70s and being in your early 90s. As would be comparing different exercise programs, for example a walking and aerobics group to a group who only gathers for social contact, seeing as research has shown that social contact can be a factor in the reduction of depressive symptoms in exercise studies (Kerse et al., 2010).

There are many aspects that still need looking into and additional studies are necessary to establish the efficacy and effectiveness of exercise as a treatment for anxiety and depression among the elderly.

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Appendix A

Yfirlýsing um upplýst samþykki fyrir þátttöku í vísindarannsókn

Ég hef fengið kynningu og nauðsynlegar upplýsingar um rannsókn þessa og samþykki þátttöku mína í henni.

Markmið rannsóknarinnar er að athuga hvort að hreyfing hafi jákvæð áhrif á þunglyndi og kvíða á meðal aldraðra. Þátttaka felur í sér að svara spurningalistum sem meta kvíða og þunglyndi.

Ávinningur og/eða áhætta samfara rannsókninni hefur verið útskýrð fyrir mér. Mér er ljóst að ég get hvenær sem er dregið þátttöku mína í rannsókninni til baka án allra eftirmála af hálfu rannsakenda.

Farið verður með allar upplýsingar sem trúnaðarmál og verða þær ekki persónugreinanlegar í niðurstöðum.

_____

Dagsetning og staður

_____

Undirskrift þátttakanda

_____

Undirskrift rannsakanda

Ábyrgðaraðili rannsóknar:
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Framkvæmdaraðili:
Kristrún Ólöf Sigurðardóttir
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Appendix B

The Icelandic Gerontological Research
Institute(RHLÖ),Landspítali-háskólasjúkrahús

Aegisgata 26, 1. Hæð, 101 Reykjavík
Reykjavik University, Tækni- og verkfræðideild

Sími: 543 9896, 616-9459 (GSM)
changmilan@gmail.com

UPPLÝST SAMÞYKKI FYRIR ÞÁTTTÖKU Í VÍSINDARANNSÓKN
"AgeActive"
Í FULLU FJÖRI, NOV-DEC 2013

Ég undirrituð/-aður þátttakandi í vísindarannsókninni "AgeActive"samþykki að fylgja áætlun um hreyfingu í alls 12 vikur. Ég samþykki einnig að fylla út dagbók og koma til mælinga í upphafi og við lok rannsóknartímabilsins, auk þess að svara einum spurningalista. Þú þarft að vera varkár til að þú skaðir þig ekki á bekknum.

Niðurstöður rannsóknarinnar munu verða kynntar fagfólki og öldruðum.

Þátttakandi hefur lesið kynningarbréf fyrir 'AgeActive'.

Undirskrift þátttakanda:

Ég _____ _____

lýsi því hér með yfir að ég gef samþykki mitt af fúsum og frjálsum vilja fyrir því að taka þátt sem sjálfboðaliði í þessari íhlutandi rannsókn sem tilheyrir AgeActive.

Ég hef fengið nauðsynlegar upplýsingar og lesið þær yfir.
Undirrituð/aður tekur þátt í líkamsþjálfun fyrir þessa rannsókn algerlega á eigin ábyrgð, meðvituð/aður um að hvers kyns líkamsrækt getur valdið meiðslum og jafnvel slysum.

Mér hefur verið kynnt eðli og umfang þessarar vísindarannsóknar og ég er samþykk(ur) þátttöku og skrifa því undir þessi tvö eintök:

_____
Dagsetning og staður:

_____
Undirskrift þátttakanda

_____
Undirritun þess sem aflar samþykkis

Ef þú hefur spurningar um rétt þinn sem þátttakandi í vísindarannsókn eða vilt hætta þátttöku í rannsókninni getur þú snúið þér til Vísindasiðanefndar, Aegisgata 26, 101 Reykjavík.
Sími: 543-9896

UPPLÝST SAMÞYKKI ÞETTA ER Í TVÍRITI, ÞÁTTTAKANDI HELDUR EFTIR EINU EINTAKI,
SÁ SEM AFLAR SAMÞYKKIS HELDUR EFTIR ÖÐRU EINTAKI

Appendix C

11 maí, 2014

Kæri þátttakandi,

Niðurstöður rannsóknar sem þú tókst þátt í liggja nú fyrir. Markmið rannsóknarinnar var að rannsaka áhrif hreyfingar á kvíða og þunglyndiseinkenni meðal aldraðra. Lagt var upp með þá tilgátu að reglubundin hreyfing myndi stuðla að minnkandi einkennum kvíða og þunglyndis. Niðurstöður rannsóknar minnar gátu ekki sýnt fram á mun á kvíða og þunglyndis einkennum milli þeirra sem stunda reglubundna hreyfingu og þeirra sem gera það ekki. Þó ber að hafa í huga að ekki er hægt að alhæfa um þessar niðurstöður. Rannsóknar hópurinn var lítill og var mikið brottfall sem hefur áhrif á niðurstöður rannsóknarinnar. Hafir þú einhverjar spurningar varðandi niðurstöðurnar er þér velkomið að hafa samband í síma 664-3524 eða senda vefpóst á netfangið Kristrun11@ru.is
Takk fyrir að hafa tekið þátt í BSc verkefni mínu.

Kær kveðja,

Kristrún Ólöf Sigurðardóttir, sálfræðinemi við Háskólann í Reykjavík.

Appendix D

GAD - 7

Hversu oft á síðastliðnum 2 vikum hefur þér liðið illa vegna eftirfarandi?	Aldrei	Nokkra daga	Oftar en helming daganna	Næstum daglega
1. Verið spennt/-ur á taugum, kvíðin/-n eða hengd/-ur upp á þráð				
2. Ekki tekist að bægja frá þér áhyggjum eða hafa stjórn á þeim				
3. Haft of miklar áhyggjur af ýmsum hlutum				
4. Átt erfitt með að slaka á				
5. Verið svo eirðarlaus að þú áttir erfitt með að sitja kyrr				
6. Orðið gröm/gramur eða pirruð/pirraður af minnsta tilefni				
7. Verið hrædd/-ur eins og eitthvað hræðilegt gæti gerst				

Appendix E

PHQ-9

Nafn_____ **Aldur**____ **Kyn:** ☐ **Kona** ☐ **Karl** **Dagsetning**_____

Hversu oft hefur eftirfarandi vandamál truflað þig síðastliðnar tvær vikur?	**Alls ekki**	**Nokkra daga**	**Meira en helming tímans**	**Nánast alla daga**
a. Lítill áhugi eða gleði við að gera hluti	☐	☐	☐	☐
b. Verið niðurdregin/n dapur/döpur eða vonlaus	☐	☐	☐	☐
c. Átt erfitt með að sofna eða sofa alla nóttina	☐	☐	☐	☐
d. Þreyta og orkuleysi	☐	☐	☐	☐
e. Lystarleysi eða ofát	☐	☐	☐	☐
f. Liðið illa með sjálfan þig eða fundist að þér hafi mistekist eða ekki staðið þig í stykkinu gagnvart sjálfum þér eða fjölskyldu þinni	☐	☐	☐	☐
g. Erfiðleikar með einbeitingu við t.d. að lesa blöðin eða horfa á sjónvarp	☐	☐	☐	☐
h. Hreyft þig eða talað svo hægt að aðrir hafa tekið eftir því? Eða hið gagnstæða – verið svo eirðarlaus eða óróleg(ur) að þú hreyfðir þig mikið meira en venjulega	☐	☐	☐	☐
i. Hugsað um að það væri betra að þú værir dáin(n) eða hugsað um að skaða þig á einhvern hátt	☐	☐	☐	☐

Íslensk þýðing með leyfi höfunda: Agnes Agnarsdóttir, Hafrún Kristjánsdóttir, Jakob Smári, Jón Friðrik Sigurðson og Pétur Tyrfingsson

Appendix F

GAD-7 Anxiety

Over the last 2 weeks, how often have you been bothered by the following problems? *(Use " " to indicate your answer"*	Not at all	Several days	More than half the days	Nearly every day
1. Feeling nervous, anxious or on edge	0	1	2	3
2. Not being able to stop or control worrying	0	1	2	3
3. Worrying too much about different things	0	1	2	3
4. Trouble relaxing	0	1	2	3
5. Being so restless that it is hard to sit still	0	1	2	3
6. Becoming easily annoyed or irritable	0	1	2	3
7. Feeling afraid as if something awful might happen	0	1	2	3

Column totals: ___ + ___ + ___ + ___

= *Total Score* _____

From the Primary Care Evaluation of Mental Disorders Patient Health Questionnaire (PRIME-MD PHQ). The PHQ was developed by Drs. Robert L. Spitzer, Janet B.W. Williams, Kurt Kroenke and colleagues. For research information, contact Dr. Spitzer at rls8@columbia.edu. PRIME-MD® is a trademark of Pfizer Inc.

Appendix G

PHQ-9 Depression

Over the last 2 weeks, how often have you been bothered by any of the following problems? *(Use "✓" to indicate your answer)*	**Not at all**	**Several days**	**More than half the days**	**Nearly every day**
Little interest or pleasure in doing things	0	1	2	3
Feeling down, depressed, or hopeless	0	1	2	3
Trouble falling or staying asleep, or sleeping too much	0	1	2	3
Feeling tired or having little energy	0	1	2	3
Poor appetite or overeating	0	1	2	3
Feeling bad about yourself — or that you are a failure or have let yourself or your family down	0	1	2	3
Trouble concentrating on things, such as reading the newspaper or watching television	0	1	2	3
Moving or speaking so slowly that other people could have noticed? Or the opposite — being so fidgety or restless that you have been moving around a lot more than usual	0	1	2	3
Thoughts that you would be better off dead or of hurting yourself in some way	0	1	2	3
Column totals	___	+ ___	+ ____	+ ___

= *Total Score* _____

From the Primary Care Evaluation of Mental Disorders Patient Health Questionnaire (PRIME-MD PHQ). The PHQ was developed by Drs. Robert L. Spitzer, Janet B.W. Williams, Kurt Kroenke and colleagues. For research information, contact Dr. Spitzer at rls8@columbia.edu. PRIME-MD® is a trademark of Pfizer Inc.