

PHYSICAL ACTIVITY AND MENTAL HEALTH: RELATIONSHIPS BETWEEN DEPRESSIVENESS, PSYCHOLOGICAL DISORDERS AND PHYSICAL ACTIVITY LEVEL IN WOMEN

M.Kull

Dept. of Exercise Biology, University of Tartu, Estonia

Abstract. This research was conducted with an objective to study relationships between physical activity and emotional wellbeing of women. The study involved 659 women aged 18–45. The following questionnaires were used: General Health Questionnaire, Health Questionnaire for Adults, Beck Depression Inventory. Physically active women experienced less stress disorders ($P<0.05$) and less depressiveness ($P<0.05$). Results showed that even a low level of physical activity (1-2 times per week) can account for positive impact on women's mental health (depressive feelings and psychological disorders).

(Biol.Sport 20:129-138, 2003)

Key words: Physical activity – Exercise – Women - Mental health

Introduction

Leisure-time physical activity has been shown to be associated with the wide variety of health outcomes, i.e. people who exercise have better physical health. Positive impact of regular physical exercise on human body has been established by the result of a high number of studies. Physical inactivity is considered one of the major risk factors for atherosclerotic cardiovascular diseases, which is the prevailing cause of death in developed countries [5,19,21,23,35].

The positive effect of physical activity on the mental health and well-being is also confirmed by different researchers who have emphasized the importance of physical exercise for reduction of depression [13,18,25,28,30]. Epidemiological research has shown that women experience psychic and psychosomatic disturbances more often than men do [14,15,31,32,34]. The conventional clinical

Reprint request to: Dr. Merike Kull, University of Tartu, Dept. of Exercise Biology, Jakobi St. 5, Tartu 51014, Estonia;

Tel.: +372 51 76 949, Fax: + 372 7375 367, E-mail: merikek@ut.ee



treatment of depression involves psycho-pharmaceuticals and psychotherapy, but there is a growing interest among the health care professionals in the role that physical activity could have in preventing the onset of emotional problems and in serving as a treatment modality once such problems have developed [16,29]. The positive relationship of physical activity and mental health was demonstrated by Stephens [28] in a cross-sectional study, by Farmer *et al.* [4], and Camacho *et al.* [3] in prospective studies, and by several randomised controlled trials [13,18].

Most of the studies on physical activity compare physically active men with their sedentary counterparts and few provide information about women [9]. Evidence is limited to a relatively small number of studies about the effect of physical activity on the psycho-emotional wellbeing of women.

The aim of the study was to measure the associations between physical activity and psycho-emotional wellbeing of women.

Material and Methods

Sample: Women aged 18-45 were studied. Subjects were randomly chosen from the Estonian Population Register and the questionnaires were sent by mail to 1200 women. Completion the questionnaire was voluntary, there was no time limit for a response. Data collection took place throughout the year 1996. Respondents remained anonymous, the overall response rate was 55%. The response rate was lower for the 26-35 year olds and the 36-45 year olds than for the 18-25 year olds. Regarding residence there was a higher response rate from towns than from villages or the country.

Questionnaires: The following questionnaires were used: the adapted Estonian versions of the General Health Questionnaire - GHQ [8]; the Health Questionnaire for Adults - HQA [22]; the Beck Depression Inventory - BDI [2].

The GHQ-40 is a self-administered screening test designed to detect current psychological disorders. The questionnaire contains 40 statements about general health and distressing situations. The test has a 4-point scale (1-2-3-4), replies are coded 0-0-1-1. The reliability of the Estonian language version of the GHQ-40 was assessed by calculating Cronbach's alpha coefficient. The Estonian versions had a high internal consistency for the whole scale (Cronbach's alpha was 0.94) and for the four subscales (Cronbach's alphas from 0.82 to 0.91) [11]. Subjects were divided into high or low GHQ scorers (cut point 12) on the basis of the mean value for the general population sample in the Tartu University database [33]. On the basis of the GHQ result we can discuss psychological disorders, not separate types

of distress since GHQ is not designed to distinguishing among psychiatric disorders or to be used in making diagnoses.

The other test we used to evaluate the mental health was the Beck Depression Inventory. The BDI is a 21-item instrument for clinical assessment of the cognitive, affective and somatic components of depression experienced during the last two weeks (rated on a 4-point scale of severity, from 0 to 3). In the Estonian version Cronbach's alpha was 0.89 [24]. We divided subjects into high or low BDI scorers (cut point 14) on the basis of the mean values for the general population sample in the Tartu University database [24]. The term "depressiveness" not "depression" is used, since BDI is an instrument to assess different components of depression, not to pronounce the medical diagnosis "depression".

An abridged version of the HQA was used to collect information about the socio-economical status, perceived health, health behaviour (lifestyle, nutrition, health risks) and physical activity. The following aspects of last year physical activity were assessed: level of leisure time physical activity, type of physical activity, evaluation of personal physical activity level regarding sufficiency of maintaining good health, comparison of personal physical activity with contemporaries, habits of physical activity in childhood retrospectively, motivation for physical activity and perceived barriers to physical activity. Details of these data and analyses have been presented elsewhere [12]. Regarding physical activity level the subjects were divided into three groups on the basis of how much of their leisure time they spent participating in physical activity which involved sweating and breathlessness:

- 1) Active – participating in physical activity 3 or more times a week,
- 2) Moderately active - participating in physical activity 1-2 times a week,
- 3) Inactive – less than once a week.

Statistics. Data analysis was carried out with the Statistical Analysis System [26]. Non-parametric statistical analysis was used for HQA data to present the frequency of variables that were due to a non-normal distribution. Chi-square analysis (statistic χ^2) was used for analyzing relationships between physical activity and mental health. Data that followed normal distribution (GHQ and BDI), was also analyzed with parametric statistic. Analysis of Variance (ANOVA), Kruskal –Wallis and Scheffe's tests were used to compare categorized variables. The significance of differences in the scores for psychological wellbeing and depressiveness in different physical activity groups were tested. Differences were considered statistically significant at $P < 0.05$ level.

Results

Respondents: The distribution of respondents by age was: 18-25 years - 52.9%, 26-35 years - 24.2%, 36-45 years - 22.9%. The educational level of respondents included those with primary education (13.8%), secondary education (36.8%), secondary technical education (31.8%) and higher education (17.6%). By the place of living were respondents represented as follows: town 59.9%, village 12.7%, country 27.4%. Proportion by marital status was: married 52.4%, single 40.5%, divorced 6.4%, widowed 0.8%.

Physical activity: According to physical activity level, 12.7% of the women were physically active, 34.8% were moderately active and 52.5% were physically inactive.

The relationships between physical inactivity and mental health: GHQ scored on a scale of 0 to 40. Of all the respondents in our study the minimum score was 0 and maximum score was 36. Only 24.4% of physically active women were high scorers (experienced psychological disorders, GHQ score 12 or more), whilst the percentage of high scorers was significantly greater among moderately active - 34.7% and inactive women - 39.9%, $P < 0.05$.

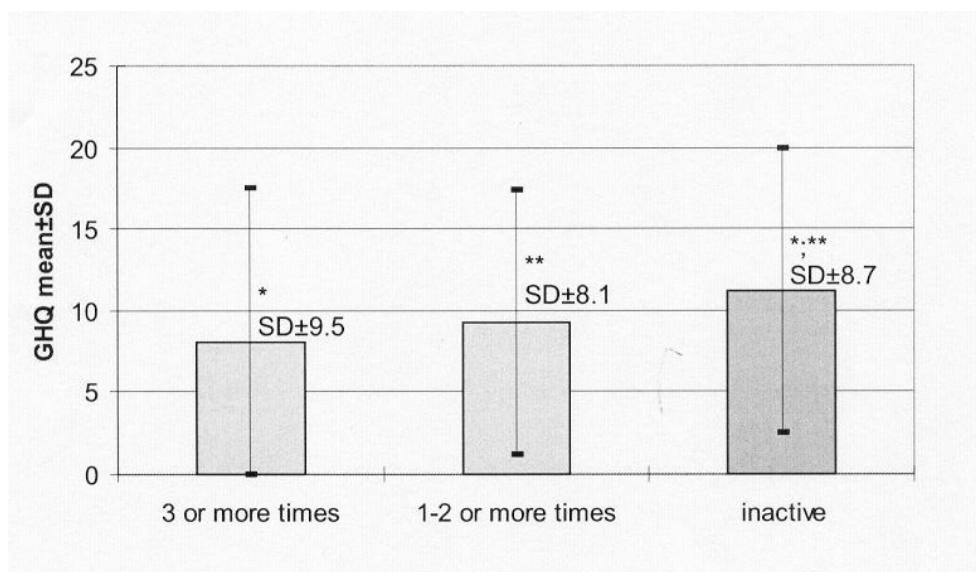


Fig. 1

The mean GHQ scores in physically active, moderately active and inactive women

*significant difference between active and the inactive group at the $P<0.05$ level;
**significant difference between moderately active and the inactive group at the $P<0.05$ level; SD – standard deviation

The ANOVA indicate, that mean GHQ score for the physically active women (8.0) and moderately active women (9.3) was significantly lower than for the inactive women (11.2). The difference in psycho-emotional state (GHQ score) between the active and moderately active, and the inactive women was significant ($P<0.05$), but was not significant between the active and the moderately active women (Fig. 1).

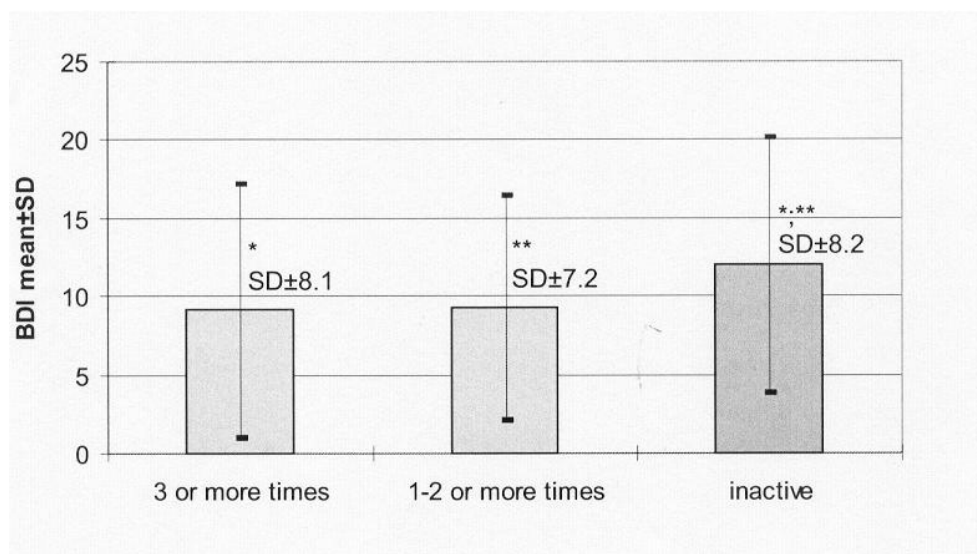


Fig. 2

The mean BDI scores in physically active, moderately active and inactive women
*significant difference between active and the inactive group at the $P<0.05$ level;
**significant difference between moderately active and the inactive group at the $P<0.05$ level; SD – standard deviation

BDI is scored on a scale of 0 to 63. Of all the respondents the minimum score was 0 and the maximum score was 51. Only 18.7% of physically active women were high scorers (BDI score 14 or more) and 21.9% of moderately active women, whilst significantly more (35%) of the physically inactive women had a high BDI score, $P<0.005$.

Similarly to GHQ results ANOVA indicate that the mean BDI score for the physically active women (9.1) and moderately active women (9.3) was significantly lower than for the inactive women (12.0). The differences in feelings of depression (BDI score) between the active and moderately active women, and the inactive women were significant ($P < 0.05$). There was no significant difference between the physically active women and the moderately active women (Fig. 2).

Discussion

Study design: In the studied group of fertile age (18-45 years) most of the gender-specific factors associated with women's poor mental health that occur in their life-course, like stress from relationships, childbirth, domestic violence, lower status work, suffer from poverty are reflected [20]. Age was limited to those above 18 years since many adult roles (e.g. socio-economic position, family formation and marital roles) may not apply or may have different meanings for younger respondents.

The relatively low percentage of respondents (55%) was probably influenced by the fact that the respondents remained anonymous and therefore it was not possible to send reminders questionnaire. We presumed we would get more veracious answers in the case of anonymity. The response rate was lower for the 26-35 year olds and the 36-45 year olds than for the 18-25 year olds. This could be because postal questionnaires are quite a new form of enquiry and older people are not yet so used to answering them as young people are.

Questionnaires: The GHQ was chosen as one of the tests because it has proved to be a simple, widely applicable and appropriate instrument for detecting psychologically disturbed persons in both clinical and non-clinical populations [7]. The other test we used to evaluate the mental health was the Beck Depression Inventory since on a society level depression is regarded as one of most common mental health disorders [6]. This was also demonstrated by the survey of the Estonian population [17].

Physical activity: The results showed that the level of physical activity recommended by the American College of Sport Medicine [1] (at least three or more times a week) was achieved by only 12.7% of respondents. More than half of respondents (52.5%) exercised less than once a week, so we classified them as inactive. A recent study of six European countries found that the overall percentage of inactive women was 32.3% [27], which demonstrates the great extent of the variation in the proportions of inactive women by countries. According to Koivula [10] the relatively low level of women's participation in sports and physical activities is clearly related to societal beliefs about the gendered nature of these

activities, and the constraining nature of these beliefs on women's behavior. Following Ståhl *et al.* [27] the strongest independent predictor of being physically active is social environment. Hence, in the Eastern - European societies, such as Estonia, the women's physical activity is not given proper consideration and it makes evident the need for increasing social support and provision of the possibilities that would enable women to be physically active.

Physical activity and mental health: The results show that low levels of physical activity are associated with poor mental health and depressiveness. Women involved in leisure time physical activity at least once a week had a significantly lower GHQ and BDI scores, reflecting better psychological well-being and less depressiveness, compared to more sedentary women. These findings confirm those of Stephens [28], who showed in a large cross-sectional study that physical activity is positively associated with good mental health, particularly for women. Similarly Farmer *et al.* [4] using a large prospective study found that physical inactivity may be a risk factor for depressive symptoms and that low levels of recreational activity at baseline predicted depression 8 years later in white women who had not been depressed previously.

When we investigated the relationships between the level of physical activity and mental health, a significant difference was found only between the physically active and inactive groups. There were no significant differences between those who exercised 3 or more times a week and those who exercised 1-2 times a week. This means that even a low level of physical activity (1-2 times a week) is positively related women's mental health. Thus although exercise 3 or more times a week may be necessary for a positive effect on people's cardiovascular system [1], even quite small amounts of exercise may improve people's mental health. Many significant health benefits may be achieved by switching from a sedentary lifestyle to one involving a minimal level of physical activity (1). Similarly Stewart *et al.* [29] found that higher baseline levels of exercise were uniquely associated with better functioning and well-being.

According to cross-sectional design of our study imposes certain limitations and means that the results must be considered with cautions because the two variables - physical activity and mental health are related, although this does not mean that one causes other. More controlled studies are required to research the causality concerning women's health and physical activity.



References:

1. American College of Sport Medicine (ACSM) (1998) The recommended quantity and quality of exercise for developing and maintaining cardiorespiratory and muscular fitness, and flexibility in healthy adults. Position stand. *Med.Sci.Sports Exerc.* 6:975-991
2. Beck A.T., R.A.Steer (1987) Beck Depression Inventory Manual. San Antonio etc., Harcourt Brace Jovanovich Inc.
3. Camacho T.C., R.E.Roberts, N.B.Lazarus, G.A.Kaplan, R.D.Cohen (1991) Physical activity and depression: evidence from the Alameda County Study. *Am.J. Epidemiol.* 134:220-231
4. Farmer M.E., B.Z.Locke, E.K.Moscicki, A.L.Dannenberg, D.B.Larson, L.S.Radloff (1988) Physical activity and depressive symptoms: the NHANES I Epidemiologic Follow-up Study. *Am.J.Epidemiol.* 128:1340-1351
5. Fletcher G.F., S.N.Blair, J.Blumenthal, C.Caspersen, B.Chaitman, S.Epstein, et al. (1992) Statement of exercise: benefits and recommendations for physical activity programs for all Americans. A statement for health professionals by the Committee on Exercise and Cardiac Rehabilitation of the Council on Clinical Cardiology. American Heart Association. *Circulation* 86:340-344
6. Goldberg D., P.Huxley (1980) Mental illness in the community. The pathway to psychiatric care. Tavistock, London
7. Goldberg D.P. (1978) Manual of the General Health Questionnaire. Slough, National Foundation for Education and Research
8. Goldberg D.P. (1972) The detection of psychiatric illness by questionnaire. Oxford Univ. Press, London
9. Kay R., A.McPherson, D.Waller (1997) The role of primary care in promoting the health of women. Women's health. *Oxford Gen.Pract.Ser.* 39:54-58
10. Koivula N. (1995) Ratings of gender appropriateness of sports participation: effects of gender-based schematic processing. *Sex Roles* 33:543-557
11. Kreegipuu M., A.Vilt, K.Liblik, K.Kaldas, L.Sema (1997) The role of dysfunctional cognition on reporting of psychological distress in the General Health Questionnaire. *Psicoterapia Cognitiva e Comportamentale* 3:94-95
12. Kull M. (1999) Socio-economic factors affecting women's physical activity in Estonia. *Acta Olympiq.Estoniae* 7:107-119
13. Labbe E.E., M.C.Welsh, D.Delaney (1988) Effects of consistent aerobic exercise on the psychological functioning of women. *Percept.Mot. Skills* 67:919-925
14. Lahelma E., P.Martikainen, O.Rahkonen, K.Silventoinen (1999) Gender differences in illhealth in Finland: patterns, magnitude and change. *Soc.Sci.Med.* 48:7-19
15. Lahelma E., K.Manderbacka, O.Rahkonen, A.-P.Sihvonen (1993) Illhealth and its social patterning in Finland, Norway and Sweden. Research Reports 27. National Research and Development Centre for Welfare and Health, Helsinki

16. Landers D.M., S.J.Petruzzello (1994) Physical activity, fitness, and anxiety. In: C.Bouchard, R.S.Shepard, T.Stephens (eds.) Physical Activity, Fitness and Health. Champaign, Human Kinetics Publ., pp 868-882
17. Lipand A., A.Kasmel, E.Tasa, M.Leinsalu M, A.Uutela, P.Puska, et al. (1995) Health behaviour survey among Estonian adult population. Helsinki, PFNPHI
18. McCann I.L., D.S.Holmes (1984) Influence of aerobic exercise on depression. *J.Pers.Soc.Psychol.* 46:1142-1147
19. Morris J.N., J.A.Heady, P.A.B.Raffle, C.G.Roberts, J.W.Parks (1953) Coronary heart disease and physical activity of work. *Lancet* 2:1053-1057
20. O'Leary A., V.S.Helgeson (1997) Psychosocial factors and women's health: integrating mind, heart, and body. In: S.J.Gallant and G.P.Keita (eds.) Health care for women: psychological, social, and behavioural influences. APA, Washington , pp 25-40
21. Paffenbarger R.S.Jr., M.E.Laughin, A.S.Gima, R.A.Black (1970) Work activity of long-shore men as related to death from coronary heart disease and stroke. *N.Eng.J.Med.* 282:1109-1114
22. Pietilä A.M. (1994) Elämäntilintä ja terveyst. Oulu, *Acta Univers.Ouluensis*, (in Finnish, English abstract)
23. Powell K.E., W.Dysinger (1987) Childhood participation in organized school sports and physical education as precursor of adult physical activity. *Am.J.Prev.Med.* 3:276-281
24. Rimm H., M.Harro, K.Karelson, M.Grauberg, A.Viru, J.Harro (1999) State of mood and self-efficacy in relation to physical activity and fitness in young healthy men. *Acta Psychiatr.Belg.* 99:16-26
25. Ross C.E., D.Hayes (1988) Exercise and psychological well-being in the community. *Am.J.Epidemiol.* 127:762-771
26. SAS Institute Inc. (1989) SAS/STAT User's Guide, Version 6 (4th ed.). Gary, NC, SAS Institute Inc.
27. Ståhl T., A.Rütten, D.Nutbeam, A.Bauman., L.Kannas, T.Abel, et al. (2001) The importance of the social environment for physically active lifestyle - results from a international study. *Soc.Sci.Med.* 52:1-10
28. Stephens T. (1988) Physical activity and mental health in the United States and Canada. Evidence from four population surveys. *Prev.Med.* 17:35-47
29. Stewart A.L., R.D.Hays, K.B.Wells, W.H.Rogers, K.L.Spitzer, S.Greenfield (1994) Long-term functioning and well-being outcomes associated with physical activity and exercise in patients with chronic conditions in the Medical Outcomes Study. *J.Clin.Epidemiol.* 7:719-730
30. Taylor C.B., J.F.Sallis, R.Needle (1985) The relation of physical activity and exercise to mental health. *Public Health Rep.* 100:195-202
31. Verbrugge L.M. (1989) The twain meet: empirical explanations of sex differences in health and mortality. *J. Health Soc.Behav.* 30:282-304
32. Vilhjalmsson R. (1993) Life stress, social support and clinical depression: a reanalysis of the literature. *Soc.Sci.Med.* 37:331-342

33. Vilt A. (1997) Discovering psychological disorders in clinical population by using General Health Questionnaire. Tartu University, Dept. of Psychology

34. Walters V. (1993) Stress, anxiety and depression: women's accounts of their health problems. *Soc.Sci.Med.* 36:393-402

35. Wood D. (1993) Coronary disease in populations. In: D.Ashton (ed.) Future trends in medicine. International Congress and Symposium Ser. No.202. London, Royal Society of Medicine

Accepted for publication 31.01.2002

Acknowledgements

This study was made possible owing to the financial support of Estonian Science Foundation grant 2378. I feel deeply indebted to Professor Emeritus Dr. Atko Viru and Assistant Professor Anne-Mai Parring for valuable comments

