Author(s): Eronen, Johanna; von Bonsdorff, Mikaela; Rantakokko, Merja; Rantanen, Taina

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Accumulation of disparity in physical activity in old age

Running Head: Disparity in Physical Activity

Johanna Eronen, Mikaela von Bonsdorff, Merja Rantakokko, Taina Rantanen

Department of Health Sciences, Gerontology Research Center, University of Jyväskylä

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Corresponding author:

Johanna Eronen

Gerontology Research Centre

P.O. Box 35 (Viveca)

FI-40014 University of Jyväskylä

Finland

Tel: +358 40 805 3550

Fax: +358 14 260 2001

e-mail: johanna.eronen@jyu.fi

Abstract

Background and aims: The level of physical activity often declines in old age, although many older people would like to be more active than what they are capable of. This leads to unmet physical activity need, the feeling that one's level of physical activity is inadequate, which is a manifestation of disparity in physical activity in old age. The accumulation of risk factors, including mobility limitations, low socioeconomic status (SES) and lack of social support may increase disparity in physical activity. The aim of this study was to investigate how the accumulation of risk factors is associated with unmet physical activity need in older community-living people. **Methods:** The study was based on cross-sectional analyses of an observational study with 632 participants. Unmet physical activity need, socioeconomic status, mobility limitations and availability of social support were self-reported by standardized questionnaires. **Results:** Having mobility limitations increased the risk of unmet physical activity need almost four-fold compared to those with no mobility limitations; having mobility limitations and either low SES or not having social support increased the risk over four-fold and having mobility limitations, low SES and no social support further increased the risk over seven-fold. **Conclusions:** We found that accumulation of risk factors increases disparity in physical activity.

Introduction

In the field of health studies, disparity has been defined as inequality (1) or as a quantity that separates a group from a specified reference on a particular measure (2). Disparity has been often studied in social and health sciences but has thus far not gained attention in physical activity research. Physical activity is one of the basic human needs, but in old age it is also a way to retain autonomy, to carry out social and personal roles and to maintain health. As people age, their level of physical activity often declines and the number of people who meet the physical activity recommendations decreases (3). However, many community-living older people would like to increase their level of physical activity and be more active. Willingness to participate in physical activity can be overridden by limitations in mobility or increasing difficulties in accessing exercise facilities or even outdoors (4). From a previous study we know that many older people report unmet physical activity need, the feeling that one's level of physical activity is inadequate (5). Unmet physical activity need is more common among people with fear of moving outdoors, environmental barriers to outdoor mobility, musculoskeletal diseases, depressive symptoms and mobility limitations than among those without these risk factors (5).

Mobility declines with age. Mobility limitations, such as difficulties in walking, often result in decreased physical activity, and may thus lead to further functional decline (6). In older people with mobility limitations, even small amounts of physical activity, such as short walks have been shown to be beneficial in order to prevent further mobility loss (7). Another important determinant of physical activity in old age is socioeconomic status (SES). Differences in SES of older people may create disparity that can reflect into various aspects of life. Sedentary lifestyle is more common in people with low SES (8). Low SES is also associated with chronic musculoskeletal complaints (9), limited ability to walk a quarter of a mile (6), difficulties in climbing up stairs (10), lower likelihood of meeting the

physical activity recommendations (3) and an increased risk of mobility decline in chronically ill people (11). In addition to low SES and mobility limitations, lack of social support i.e. loneliness and lack of a confidant, such as a spouse or a friend, may also reduce the probability of engaging in physical activity in old age (12).

In this study the term disparity is used to describe the unequal opportunities to engage in physical activities which are manifested as unmet physical activity need. Accumulation of disparity in physical activity refers to a situation in which older people may have unequal opportunities to participate in physical activity, due to clustering of poor SES, limitations in mobility and lack of social support. The aim of this study is to investigate the association of accumulation of these risk factors with unmet physical activity need in older community-living people. In addition, we studied the associations of co-existing risk factors on unmet need for physical activity among older people.

Materials and methods

Design

The study was based on cross-sectional analyses of the observational study entitled "Screening and Counseling for Physical Activity and Mobility" (SCAMOB) (ISRCTN 07330512). The SCAMOB study was a project investigating the effects of physical activity counseling in community-living older people in Finland and the details of the project are described elsewhere (13).

Study population

The target population included all 75-81-year-old persons living in a certain health care district area in Jyväskylä city centre in 2003 (N=1310). After a four-phased screening process, there were 632 participants in the cross-sectional analysis of whom 629 had provided information on the questions concerning unmet physical activity need. To be eligible for the study the participants had to be able to walk 500 meters without assistance, be only moderately active or sedentary, have no severe cognitive impairment i.e. Mini-Mental State Examination score over 21 (14), no medical contraindications for physical activity and sign an informed consent to participate. The Ethical Committee of the Central Finland Central Hospital approved the SCAMOB project.

Measurements

The risk factors included mobility limitations, low SES and lack of social support. Mobility limitations were assessed by asking the participants about their perceived difficulties in walking 2 km and climbing up 1 flight of stairs with a structured questionnaire. The questions were "Do you have difficulty in walking 2 km?" and "Do you have difficulties in climbing up 1 flight of stairs?" and the

response options for both questions were 1) I am able to manage without difficulties, 2) I am able to manage with some difficulty, 3) I am able to manage with great deal of difficulty, 4) I am able to manage only with help of another person, or 5) I am unable to manage even with help. For the analyses, the options were dichotomized as no or some difficulties (1-2) and a great deal of difficulties (3-5). Those with a great deal of difficulty in walking 2 km or climbing stairs, or both, were rated as having mobility limitations (4).

SES was categorized based on the highest level of education and long-term occupation. A dichotomous variable for SES was created in the following way. People were categorized as having low SES if they had gone through less than secondary school education and had worked as untrained workers or farmers or had been housewives. Trained workers and entrepreneurs were also included in the low SES group if they had only elementary education. High SES group consisted of people who had gone through secondary or higher education or who had held a managerial position. In addition, trained workers with more than elementary education were included in this group.

The availability of social support was assessed by asking whether the participants had someone to talk to whenever they wanted. The response options were 1) nearly always, 2) fairly often, 3) occasionally, and 4) not at all. For the analyses, the responses were dichotomized as nearly always or fairly often (1-2) and occasionally or not at all (3-4).

The outcome measure of this study was unmet physical activity need, which indicates disparity in physical activity. Unmet physical activity need was studied by asking the participants the following two questions: “Do you feel that you would have the opportunity to increase your level of physical activity if someone recommended you to do so?” and “Would you like to increase your level of

physical activity?" with response options of yes and no. The dichotomous outcome variable was created by defining persons who felt that they had no opportunity to engage in physical activity but were willing to increase their physical activity level as experiencing unmet physical activity need (5).

Physical inactivity was assessed by a standardized question which was modified from the classification of physical activity among elderly people by Grimby (15). The question included seven alternative responses: mainly resting or only minimal physical activity, most activities performed sitting down, light physical activity, moderate physical activity about 3 h a week, moderate physical activity at least 4 h a week or heavy physical activity ≤ a week, physical exercise several times a week or heavy leisure time working at least 3 h a week and competitive sports several times a week. As part of the study design (13), those in the three highest categories of physical activity were excluded from the study. Of the four remaining physical activity categories, those participants who belong to the three lowest categories (most activities performed sitting down, light physical activity or moderate physical activity about 3 h a week) were categorized as physically inactive (16).

Background characteristics included age, living arrangements (alone or with someone), presence of lung, cardiovascular and musculoskeletal diseases, and the number of prescription medications checked during the home interview.

Statistical Analysis

Characteristics of the participants were described by using means and standard deviations or percentages. Differences between older people with and without unmet physical activity need were analyzed using chi-square tests for categorical variables and *t*-tests for continuous variables. Logistic

regression analysis was used for identifying factors associated with unmet physical activity need. Associations were adjusted for age and sex.

To study the associations of co-existing risk factors on unmet physical activity need, four exclusive groups were formed on the basis of mobility, SES and the presence of social support: 1) no mobility limitations (the reference group); 2) mobility limitations, but no other risk factors, 3) mobility limitations and either low SES or lack of social support; 4) mobility limitations, low SES and lack of social support.

All tests were performed two-tailed and the level of significance was set at $p<0.05$. Analyses were carried out with PASW statistics (SPSS version) 18.

Results

The mean age of the participants (n=629) was 77.6 ± 1.9 years and 75% of them were women. 13% of participants were categorized as experiencing unmet physical activity need. Table 1 presents the differences in descriptive characteristics for those with and without unmet physical activity need. Participants with unmet physical activity need had more often musculoskeletal diseases (69.1% vs. 49.2%, p=0.001) and used more prescription medication (5.72 vs. 3.83, p<0,001) than participants without unmet physical activity need. There were no statistically significant differences in SES between the groups. People with unmet physical activity need reported more often lack of social support (26.8% vs. 18.3%, p<0.071) even though they less frequently were living alone (47.9% vs. 59.6%, p<0.039). People with unmet physical activity need were more often physically inactive (40.2% vs. 23.2%, p<0.001).

The associations of risk factors with unmet physical activity need, adjusted for age and sex, are presented in Table 2. Having mobility limitations increased the risk for unmet physical activity need OR 4.52 (95% confidence interval (CI) 2.73-7.48). The associations of low SES OR 1.26 (95% CI 0.79-2.00) or lack of social support OR 1.58 (95% CI 0.92-2.71) did not reach statistical significance.

The associations of co-existing risk factors, including mobility limitations, low SES and lack of social support with unmet physical activity need is presented in Table 3. The model is adjusted for age and sex. Compared to those with no mobility difficulties (referent), having mobility limitations but no other risk factors increased the risk of unmet physical activity need OR 3.86 (95% CI 1.86-8.03), having mobility limitations and either low SES or lack of social support increased the risk OR 4.11 (95% CI

2.09-8.09) and having mobility limitations, low SES and lack of social support further increased the risk OR 7.10 (95% CI 2.71-18.57).

Discussion

In this study we showed that the accumulation of risk factors, including mobility limitations, low SES and lack of social support, increased significantly the risk of unmet physical activity need. In our study, people with mobility limitations and but no other risk factors had an almost four times higher risk for unmet physical activity need compared with people with no mobility limitations. In older people with mobility limitations and one risk factor (either low SES or lack of social support) the risk was over four-fold. The risk of unmet physical activity need was over 7-fold among people who reported mobility limitations, low SES and lack of social support.

Unmet physical activity need, defined as the feeling that one's level of physical activity is inadequate (5) is an issue that has been recently brought into the scientific discussion and is therefore relatively unknown. In our previous study, we found that unmet physical activity need is common among old home-dwelling people who also report mobility limitations and barriers in their near environment (5). The present study expanded the earlier findings showing that clustering of other risk factors in addition to mobility limitations greatly increases the risk of unmet physical activity need. The accumulation of risk factors seems to create disparity that is manifested as increased risk for unmet physical activity need in those older people with the most disadvantages.

It is possible that these results are due to the fact that older people with deteriorating mobility and good SES possess resources that alleviate the problems in participating in physical activity. These may be not only the material resources needed for being physically active and exercising, but also the resources for and knowledge about a healthy lifestyle (17). The older people who in this study reported unmet physical activity need also reported lack of social support more often than people without unmet

physical activity need. It is possible that lack of social support results in unmet physical activity need as people who receive less encouragement for physical activity become less physically active. However, it is plausible that a situation leading to unmet physical activity may also result in reduced availability of social support. People who have difficulties exiting their homes unavoidably experience a reduction in their social contacts as well. Our findings are consistent with earlier studies showing that social support has an important role in the physical activity of older people (18) and that lack of company is more likely a barrier to physical activity in people with more severe mobility limitations compared to people with no mobility limitations (4).

In the current study, one out of five of physically inactive people experienced unmet physical activity need. This indicates that physical inactivity and unmet physical activity need correlate with each other but do not completely overlap. In our previous study we suggested that unmet physical activity need may be transient. It may be experienced for some time, but after a while people may adapt to their new level of lower physical activity and the feeling can disappear (5). Older people, who report unmet physical activity need, represent a potential target group for physical activity interventions as long as the interventions are tailored to meet their resources for participation. People with pre-clinical or manifest mobility limitations probably need interventions which include intensive encouragement and social support and some form of compensatory approach (such as help from a volunteer worker or transportation) to enable them to participate in physical activities (16). It should also be taken into account that availability of inexpensive exercise forms may facilitate participation particularly among older people with low SES.

Study strengths and limitations

The strength of this study is the large population-based sample. The study was limited by the study sample being a truncated sample of older people living in a city center area. People who were unable to walk at least 0.5 km were excluded from the study, thus excluding people with the most limited mobility and also probably the lowest number of social contacts and the lowest physical activity levels. Therefore, the number of old people who experience unmet physical activity need may be underestimated. Measures of physical activity were self-reported as no data on objective measurements such as accelerometers were available. Another limitation of this study is the cross-sectional design which doesn't allow interpretation of the temporal order of mobility limitations, lack of social support and unmet physical activity need. The data collection for this study was performed between April and June, thus the results do not take into account the possible role of winter conditions in a Nordic country.

Conclusions

We found that accumulation of certain disadvantages increases the disparity in physical activity manifested as unmet physical activity need. This study addressed unmet physical activity need, which has been recently introduced but so far only little studied. We provide a novel approach into research on physical activity and aging by emphasizing people's own views about the adequacy of their present level of physical activity instead of addressing whether people meet the physical activity recommendations or not.

Unmet physical activity need should be studied more broadly across diverse populations including older people who are unable to get out of their homes independently due to mobility limitations. In addition, research on the temporal occurrence of the risk factors, such as lack of social support and mobility limitations, is needed to better understand the process leading to unmet physical activity need, and to find ways to prevent it.

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Table 1. Characteristics of the participants

Characteristic	With unmet physical activity need (n= 82)	Without unmet physical activity need (n=547)	*P*-value*
Age, mean ± SD	77.8 ± 1.9	77.6 ± 1.9	0.333
Female, %	78.0	74.4	0.478
Mobility limitations, %	43.2	14.3	<0.001
Low SES, %	51.2	45.3	0.319
Lack of social support, %	26.8	18.3	0.071
Lives alone, %	47.6	59.6	0.039
Physically inactive, %	40.2	23.2	0.001
Lung disease, %	23.5	15.5	0.074
Cardiovascular disease, %	71.6	65.8	0.302
Musculoskeletal disease, %	69.1	49.2	0.001
Number of medications, mean ± SD	5.72 ± 3.0	3.83 ± 2.7	<0.001

*Chi-square test and *t*-test.

SD = Standard deviation.

Table 2. The associations of risk factors with unmet physical activity need

Risk factor	Odds Ratio (95 % Confidence Interval)
Mobility limitations	4.52 (2.73-7.48)
Low socioeconomic status	1.26 (0.79-2.00)
Lack of social support	1.58 (0.92-2.71)

Adjusted for age and sex

Table 3. Risk of unmet physical activity need among people with mobility limitations and other co-existing risk factors compared to people with no mobility limitations

Variable	Number of participants	Odds Ratio (95 % Confidence Interval)
No mobility limitations	513	1
Mobility limitations but no other risk factors	43	3.86 (1.86-8.03)
Mobility limitations and one other risk factor*	51	4.11 (2.09-8.09)
Mobility limitations and two other risk factors++	19	7.10 (2.71-18.57)

Adjusted for age and sex

*Either low socioeconomic status or lack of social support

++ Low socioeconomic status and lack of social support