

Perceived barriers to physical activity across Norwegian adult age groups, gender, and stages of change.

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Abstract:

This study investigated differences in the type of and number of perceived barriers to engagement in physical activity experienced by adult women and men in the same geographical area, the relationship between the experienced barriers and stages of change in relation to exercise behavior, and identified barriers related to reported engagement in leisure-time physical activity. Data were obtained from a population study by the National Institute of Public Health in two counties during 2000–2001. The sample consisted of 2709 females and 2212 men in the age groups 75, 60, 45, 40 and 30 years. Questionnaires measured barriers to engagement in physical activity, engagement in physical activity and readiness for engaging in physical activity (stages of change). Multivariate analyses of variance demonstrated significant age and gender differences in the perceptions of barriers at the various stages of change. The logistic regressions [estimated odds ratios (OR)] demonstrated that low scores for affective/cognitive and practical barriers were significantly associated with higher OR for engagement in physical activity for women, and low-priority barriers and lower age were associated with higher OR for being physically active for men. The information from this study should be valuable for designing and tailoring both motivational strategies and interventions to fit targeted groups.

Keywords: physical activity | barriers | stages of change | sports science | sports medicine

Article:

Physical inactivity has been recognized as an independent health risk factor (USDHHS, 2000, 1996; Barengo et al., 2004). As a consequence, increasing levels of physical activity has become “an imperative” for public health (Sparling et al., 2000). A growing body of research has focused on better understanding the correlates of physical activity and explaining the variation in peoples' activity patterns. Such knowledge can, in addition to increasing our understanding, help identify meaningful strategies for interventions.

Obviously, any type of health behavior is determined by a complex set of factors including social and cultural factors, socio-economic status, physical as well as social environment and individual psychological factors (Troost et al., 2002; Burton et al., 2005). Psychological factors include knowledge, perceptions, motives and attitudes related to physical activity, such as self-efficacy, social norms and perceived barriers (Wilcox et al., 2002; Oulton et al., 2005). It is important to understand how such psychological factors operate across various social and cultural groups in order to develop effective behavioral change programs (Young & King, 1995; Conner & Norman, 1996). One way of increasing such understanding is to identify and address the variation in the perception of barriers in different groups of a population, and how this is related to participation in physical activity.

Exploratory studies have identified important barriers for engagement in physical activity (Allied Dunbar Fitness Survey, 1992; Brawley et al., 1998; Chada & Kolt, 2003), and the barrier concept figures in the major theories that have been applied to physical activity behavior, including the theory of planned behavior (Ajzen, 1988; Conner & Sparks, 1996), social cognitive theory (Bandura, 1986; McAuley, 1992) and personal investment theory (Maehr & Braskamp, 1986).

Results from studies of barriers to engagement in physical activity indicate that a few barriers seem to be universally reported (e.g., lack of time, Zunft et al., 1999), whereas other barriers (e.g., attitude toward exercise, lack of facilities) vary with cultures and different segments of the population (Chada & Kolt, 2003). However, few studies have compared perceptions of barriers across gender and ages within a non-English-speaking-cultural area with a relatively high physical activity participation.

There seem to be consistent gender differences in the perception and reporting of barriers for physical activity (Auweele et al., 1997; Bjerke Karlsen & Ommundsen, 1997; Baranowski et al., 1998; Bengoecha et al., 2005). Owing to different life situations, young, middle-aged and elderly individuals may well experience different barriers for movement and exercise, and reports from some studies seem to support this belief (Wold et al., 2000).

The transtheoretical model (TTM) (Prochaska & di Clemente, 1984; Marcus & Simkin, 1994) offers a way to investigate the relationships among perceived barriers and degrees of engagement in physical activity. The TTM is a theoretical model of behavioral change, and involves both processes of change and a temporal dimension where behavioral change occurs through stages. The first stage (precontemplation) comprises no intention to become physically active. The

contemplation stage is one of intentions but no engagement in physical activity. The preparation, action and maintenance stages all include engagement in physical activity of various regularities and durations (Marcus & Simkin, 1994).

The TTM model has been criticized for not being developed for the complexity of physical activity, for not including the real determinants of physical activity and lack of validation of the stages (Adams & White, 2004; Brug et al., 2004). However, studies using the TTM applied on smoking cessation have found the distribution of smokers in the first three stages to be similar across large representative samples within the United States and Europe, but that the US and European distributions were very different (Velicer et al., 1995; Etter et al., 1997). It may therefore be important to investigate the distribution of exercisers on the stages of change in a non-US sample. In general, we would expect people to report more barriers, and experience the barriers to be more important at the lower end of the continuum of stages (precontemplation & contemplation). Further, we would expect different barriers to be prominent for men and women, different age groups and at the different stages of change.

One way of approaching the cultural differences in perception of barriers is to examine a large representative group of adults within a smaller geographical area that is relatively homogenous culturally. In this study, the population consisted of the inhabitants of two counties in Norway. All inhabitants in selected age groups of adults were invited to a free physical health check and to participate in the study. The sample thus comes from a country with a relatively high participation in physical activity and reflected the diversity of the adult population and a range of engagement in physical activity.

The purposes of this study were (1) to describe age and gender differences in perceived barriers to engagement in physical activity of 30-, 40- and 45-, 60- and 75-year-old women and men in two counties of Norway. (2) To describe the distribution of participants across the stages of change, and to investigate differences in the experienced barriers to engagement in physical activity for groups at various stages of change. (3) To identify the barriers most strongly related to present engagement in physical activity [estimated by odds ratios (OR)]. The resulting information should be valuable for designing and tailoring both motivational strategies and interventions to fit targeted groups.

Materials and methods

Participants and procedures

Data were obtained from a population-based cohort study by the National Institute of Public Health in two counties during the years 2000–2001 (Norwegian Institute of Public Health, 2003). All inhabitants identified by the National Register, in the age groups 30, 40, 45, 60 and 75 years, were invited to a free health examination and to answer questionnaires as part of the National monitoring of the health situation in the country. The age groups were selected to reflect a range of groups in the adult population. Two questionnaires (one main and one supplemental questionnaire specific to the current study) were sent out with the invitation. It was expected that these were filled out before attending the clinical examination. The questionnaires were collected by the health personnel in conjunction with the physical examination, but could also be sent by post. Questions about physical activity engagement were included in the main questionnaire; the questions about barriers and motivation for physical activity were part of the supplemental questionnaire. Invitations were sent to 11 288 women and 10 984 men, and 60.4% of women (N=6820) and 51.5% of men (N=5684) participated, 56% in all (N=12 504). The sample for this study consisted of those individuals who answered the questions on the supplemental questionnaire about barriers to engagement in physical activity (N=4921, 2709 women and 2212 men).

Public statistics for the year 2000 (Statistics Norway, 2001) demonstrated that 15.4% of the population in these two counties had education at the university level, and in the sample the percentage was 18.9%. In the whole population, 23.7% (men=24.1%, women=21.6%) reported a physically inactive leisure time (mainly reading, watching TV), and in the sample 23.6% (men=23.5%, women=23.6%) did the same. The present sample thus has a slightly higher proportion of individuals with higher education (3, 5% more), but was similar to the rest of the population regarding percentages of individuals reporting to be physically inactive.

Measurements

Barriers to engagement in physical activity

Owing to cultural differences, it is recommended that knowledge about the specific population studied be obtained (Brawley et al., 1998). To ensure that barriers in the questionnaire were relevant to this sample, we built upon former investigations in Norway in which middle-aged participants had identified barriers to their participation in physical activity (Pensgaard, 1993; Sorensen, 1997). We included all barriers identified in that research, and added two barriers known to be a problem for an elderly population in other investigations: need to rest and relax (Allied Dunbar Fitness Survey, 1992; Hays & Clark, 1999), and dizziness (Elverland, 2002).

Brawley et al. (1998) also recommended including details about how limiting a barrier is perceived to be. People cope differently with barriers, so that the extent to which a barrier actually keeps people from engaging in physical activity or exercise is not automatic. Likewise, it may be argued that the number of barriers experienced is likely to be important because it may be easier to overcome one or only a few barriers rather than many.

The participants (N=4921) rated 14 possible barriers as very important (scored 3), quite important (scored 2), not important (scored 1) or not relevant (scored 0). The number and percentages of individuals who rated the barrier as very important or important are presented in Table 1. The items have been translated from Norwegian for the purpose of publication in English.

Table 1. Total N, and number and percentages of individuals who rated the barriers as very important or important

Barrier	Total N	N reporting	%
It is too expensive for me	4713	258	5.2
I do not think it is of importance for my health	4607	1789	36.4
I do not like to be physically active	4597	1306	26.5
I do not have time and energy	4630	2370	48.8
I do not think I will get anything out of it	4601	1007	20.5
I do not see myself as a physically active person	4620	1479	30.1
Health problems hinder me	4921	2022	41.4
I need more rest and relaxation	4837	2128	43.2
I am bothered by dizziness	4788	708	14.4
I feel more like doing other things	4760	2072	42.1
I lack an adequate opportunity	4739	687	14.0
I have nobody to do it with	4728	941	19.1
I do not dare to exercise	4693	374	7.6

I lack transport

4719

258

5.2

We performed an exploratory factor analysis of the barriers using principal component extraction with oblique rotation as we expected some correlation between factors (Norusis, 2000). The analysis yielded four factors. Factor one corresponded to practical hinderances (five items), factor two described cognitive/affective barriers (four items), factor three described barriers related to health (three items) and the fourth factor had two items about giving other things priority, and lack of time and energy. The ratings of the individual barriers within one factor were summed and divided by the number of items to give comparable mean scores for the scales. The mean scores for the different barrier scales are also included in Table 2. According to the criteria suggested by Nunally (1978), the Chronbach α values were satisfactory for the practical barrier scale, the affective/cognitive barrier scale and the health barrier scale. The value was somewhat lower for the scale with only two items, as could be expected, and the priority barrier scale therefore needs to be interpreted with care.

Table 2. Results from the factor analysis. Principal component, oblique rotation

Variables	Factors			
	1	2	3	4
Health problems hinder me	0.220	-0.180	0.803	-0.171
I need more rest and relaxation	0.221	-0.220	0.768	0.294
I am bothered by dizziness	0.348	-0.198	0.712	0.008
I lack an adequate opportunity	0.796	-0.308	0.159	0.239
I have nobody to do it with	0.787	-0.328	0.101	0.293
I do not dare	0.733	-0.342	0.404	0.148
I lack transport	0.743	-0.291	0.378	0.038

It is too expensive for me	0.736	-0.268	0.227	0.246
I feel more like doing other things	0.294	-0.185	0.050	0.802
I do not have time and energy	0.238	-0.345	0.061	0.760
I do not think I will get anything out of it	0.388	-0.802	0.199	0.260
I do not think it is of importance for my health	0.241	-0.762	0.186	0.030
I do not like to be physically active	0.305	-0.809	0.139	0.250
I do not see myself as a physically active person	0.315	-0.778	0.170	0.312

Internal consistency	Chronbach's α	Mean score	(SD)
Factor 1: practical barriers:	0.83	0.68	0.60
Factor 2: affective/cognitive barriers:	0.80	1.03	0.78
Factor 3: health barriers:	0.65	1.00	0.76
Factor 4: priority barriers:	0.51	1.34	0.83

* Factor loadings in bold represent the items loading on that factor.

Engagement in physical activity

Engagement in leisure-time physical activity (LPA) was assessed by the question: “Describe the extent of movement and bodily exertion in your leisure time. If the activity varies considerably over seasons, estimate an average for the past year.” The answering alternatives were 1. No regular LPA (reading, watching TV and other sedentary activities), 2. Regular light LPA (walking, biking and Sunday walks at least 4 h per week), 3. Moderate heavy LPA (like recreational sport or heavy gardening at least 4 h per week) and 4. Heavy exercise or sport competition (regularly and several times a week). This way of measuring physical activity during leisure time was developed in the 1960s (Saltin & Grimby, 1968). The instrument has been found to correlate positively with aerobic capacity (Lochen & Rasmussen, 1992) and negatively with mortality (Holme et al., 1981; Meyer et al., 2002) and its indirect validity has been studied by correlation with anthropometric markers and serum lipids (Aires et al., 2003).

Stages of change

Stages of change in relation to physical activity were measured as recommended by Marcus and Simkin (1994). The question was formulated as: “Below there are some statements describing various levels of physical activity. Please indicate the level that best suits your situation (choose only one alternative).” The answering alternatives (translated from Norwegian for the purpose of publication) were: (1) For the time being I am not physically active and have no plans to become physically active within the next 6 months (precontemplation), (2) for the time being I am not physically active but I have plans to become physically active within the next 6 months (contemplation) and (3) for the time being I am somewhat physically active, but not regularly (preparation), and (4) for the time being I am physically active, but have been so <6 months (action), and (5) for the time being I am physically active, and I have been so for more than 6 months (Maintenance).

In spite of the critique, there are several studies that have demonstrated positive psychometric properties for the stages of change measure in relation to physical exercise. Concurrent validity was demonstrated by Marcus and Simkin (1993). Sarkin et al. (2001) reported concurrent and construct validity for the stages of change measure among an overweight population, and Cardinal (1997) found significant differences between the stages for body mass index, cardiorespiratory fitness, exercise behavior, relapse, barriers and self-efficacy among 235 adults. Schuman et al. (2002) demonstrated support for the construct validity of the measure for strenuous and moderate exercise in adolescents, student and adult samples. However, Dannecker et al. (2003) reported only partial support for hypothesized stage differences.

Analyses

Data were analyzed with SPSS (Norusis, 2000). For descriptives, we used frequencies and crosstabulations with chi squares. For multivariate associations between type of barriers and gender, age and stages of change, we used multivariate analyses of variance (MANOVA). Where significant main effects were demonstrated by the MANOVA, we followed up with comparisons of differences across groups, using one-way analyses of variance (ANOVA) with post hoc tests (Bonferroni), or t-tests where there were only two groups (gender). We used logistic regressions in order to estimate OR for being engaged in physical activity or not.

Results

Descriptives

The distribution of men and women in different age groups, on the stages of change, and mean scores for the various barrier measures are shown in Table 3. There were few differences between the 40- and 45-year-olds, and so those two age groups were collapsed into one in the further analyses. In general, the scores on practical barriers were the lowest, and the highest for the health barriers. Age differences were the greatest on the priority barriers..

Table 3. Descriptive information about the sample

	<i>N</i> (%)				Sum
	30 years	40/45 years	60 years	75 years	
Participants					
Total <i>N</i> =4921					
Women	554 (20.4)	1203 (44.4)	613 (22.6)	339 (12.5)	2709 (100)
Men	297 (13.4)	1017 (46.6)	547 (24.6)	351 (15.8)	2212 (100)
Physically active					
Total <i>N</i> =4495					
Women	361 (66.5)	386 (64.4)	424 (71.6)	93 (56.7)	1663 (67.2)
Men	183 (62.5)	324 (66.9)	401 (74.4)	119 (64.7)	1393 (68.9)
Stages of change					
Total <i>N</i> =4821					
Precontemplators					
Women	41 (7.4)	48 (7.9)	83 (13.9)	79 (25.5)	298 (11.2)
Men	32 (10.3)	52 (10.8)	62 (11.6)	60 (23.7)	273 (12.6)
Contemplators					

		<i>N (%)</i>				
		30 years	40/45 years	60 years	75 years	Sum
Women		182 (33.0)	187 (30.7)	105 (17.5)	54 (17.4)	698 (26.3)
Men		90 (30.7)	158 (32.7)	103 (19.3)	35 (10.4)	518 (23.9)
Preparers						
Women		224 (40.7)	258 (42.3)	280 (46.7)	110 (35.5)	1112 (42.0)
Men		115 (39.2)	191 (39.5)	233 (43.7)	116 (34.4)	903 (41.6)
Action						
Women		36 (6.5)	29 (4.8)	13 (2.2)	2 (0.6)	103 (3.9)
Men		4 (1.4)	13 (2.7)	15 (2.8)	5 (1.5)	49 (2.3)
Maintenance						
Women		68 (12.3)	88 (14.4)	118 (19.7)	65 (21.0)	439 (16.6)
Men		52 (17.7)	69 (14.3)	120 (22.5)	101 (30.0)	428 (19.7)

There was no significant gender difference in engagement in physical activity (LPA measure), with 68.9% of the men and 67.2% of the women classified as active ($\chi^2=1.39$, $df=1$, $P=0.239$). Chi-square analyses demonstrated that the percentage of physical activity was significantly lower with higher age both for women ($\chi^2=16.9$, $df=4$, $P=0.002$) and for men ($\chi^2=16.90$, $df=4$, $P=0.003$).

Distribution on the stages of change

The largest group for both genders and in all age groups were the preparers, people who describe themselves as physically active but not regularly. There were very few in the action stage.

Compared with distributions reported in other studies (Courneya & Bobick, 2000; Matsumoto & Takenaka, 2004), this sample had relatively more individuals at the precontemplation stage and fewer in the maintenance stage, being more similar to some other European samples (Kearney et al., 1999; Whitelaw et al., 2000).

A chi-square analysis demonstrated gender differences in the distribution on the different stages of change ($\chi^2=21.360$, $df=4$, $P<0.001$). There were relatively higher percentages of men than women at both the precontemplation and the maintenance stages, and more women at the contemplation stage. There were age differences in the distribution of stages of change for both men ($\chi^2=136.95$, $df=16$, $P<0.001$) and for women, ($\chi^2=166.18$, $df=16$, $P<0.001$). The percentage of precontemplators increased with age, but so did the percentage of people in the maintenance stage. There were relatively more contemplators among the younger groups of both men and women.

Multivariate analysis

MANOVA was performed with the four barrier scores and number of barriers as dependent variables, and gender, age and stage of change as independent variables. Overall, the analysis demonstrated main effects for gender (Wilks $\lambda=0.99$, $F=4.40$, $df=5.00$, $P<0.001$), age (Wilks $\lambda=0.94$, $F=16.36$, $df=15.00$, $P<0.001$) and stage of change (Wilks $\lambda=0.96$, $F=8.49$, $df=20$, $P<0.001$), which were qualified by some interactions. The interaction effects were significant for age by stage of change (Wilks $\lambda=0.97$, $F=2.48$, $df=60$, $P<0.05$), and gender by stages of change (Wilks $\lambda=0.99$, $F=1.82$, $df=20$, $P<0.05$).

Follow-up *t*-tests demonstrated that more women than men reported stronger health barriers, practical barriers and priority barriers, and experienced higher numbers of barriers. There were no gender differences for the affective/cognitive barriers. Details from the *t*-tests for the various barriers were: health barriers ($t=-4.92$, $df=4667$, $P<0.001$), priority barriers ($t=-3.94$, $df=4508$, $P<0.001$), practical barriers ($t=-8.41$, $df=4567$, $P<0.001$), and number of barriers ($t=-6.04$, $df=4919$, $P<0.001$) and affective/cognitive barriers ($t=0.50$, $df=4351$, $P=0.616$).

Age differences

Scores on health barriers, affective/cognitive barriers and number of barriers increased with age for both genders, whereas the younger groups scored higher on the priority barriers. Details from the chi-square analysis were: health barriers ($\chi^2=368.46$, $df=24$, $P<0.001$), priority barriers ($\chi^2=264.58$, $df=16$, $P<0.001$), practical barriers ($\chi^2=133.85$, $df=40$, $P<0.001$), affective/cognitive barriers ($\chi^2=231.87$, $df=32$, $P<0.001$) and number of barriers ($\chi^2=128.76$, $df=56$, $P<0.001$).

Types and number of barriers in relation to stage of change, age and gender

We followed up with univariate tests to determine which variables contributed to the overall interaction differences. As shown in Figs 1–5, slightly different patterns emerged for the various types of barriers. The general pattern demonstrated decreasing barrier scores with increasing readiness for physical activity as defined by the continuum of stages of change. However, this decrease was not significant for all age groups on all the barriers, and the main age differences were between the two older and the two younger age groups. In addition, both men and women in the action stage demonstrated scores that deviated from this pattern for most of the types of

barriers. The number of individuals in the action stage was low, especially for the older age groups, and this may reduce the value of the information for this stage. Because of this, details about the action stage will be omitted in the following. The results for each type of barrier are summarized below:

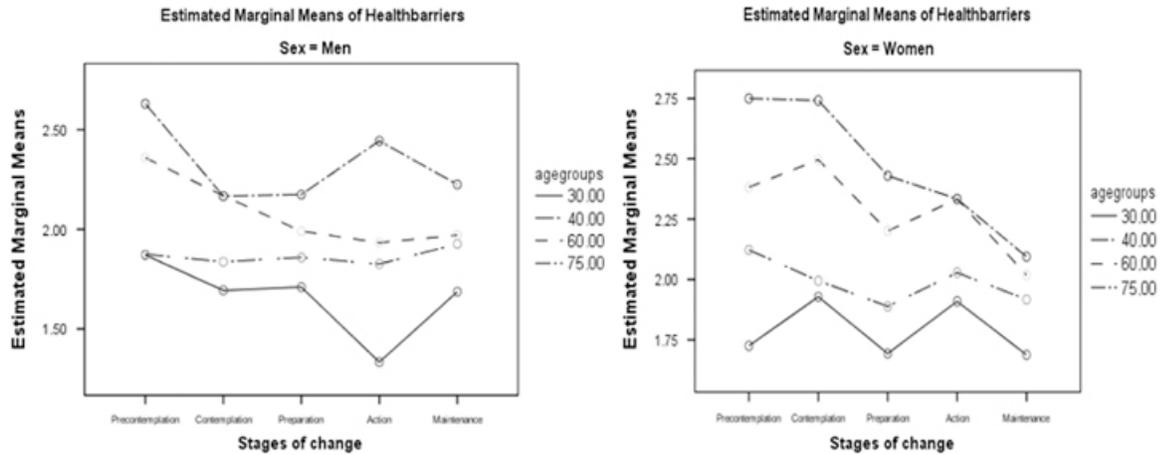


Figure 1. Health barrier mean scores for the age groups at the various stages of change for men and women.

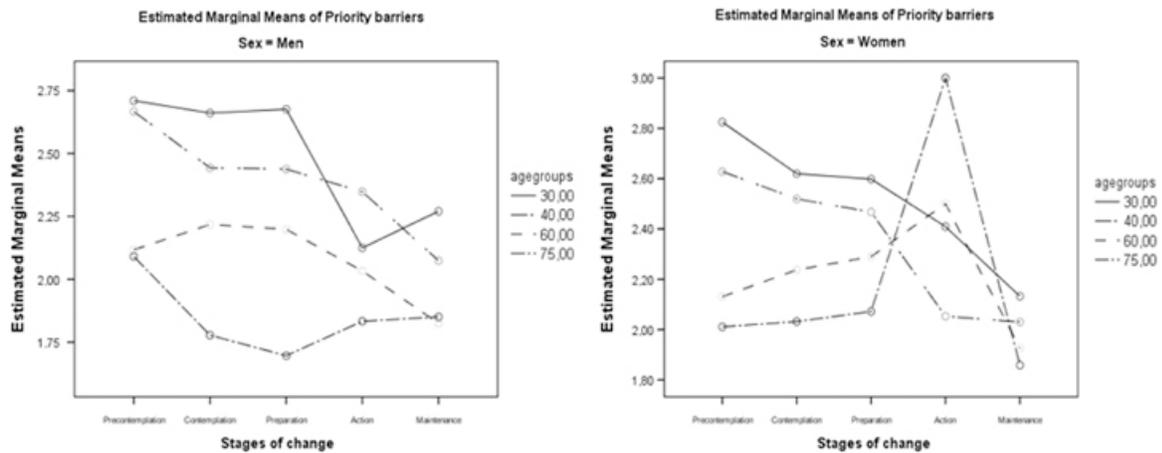


Figure 2. Priority barrier mean scores for the age groups at the various stages of change for men and women.

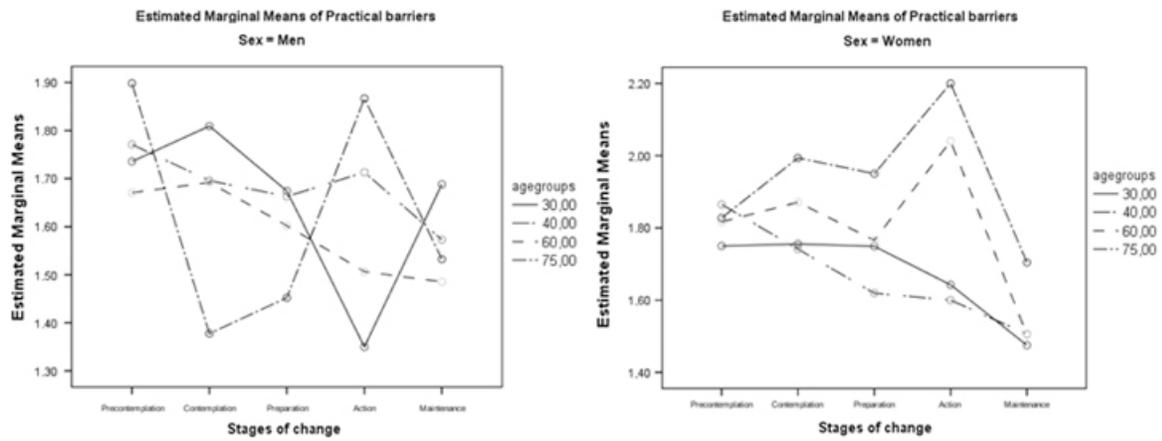


Figure 3. Practical barrier mean scores for the age groups at the various stages of change for men and women.

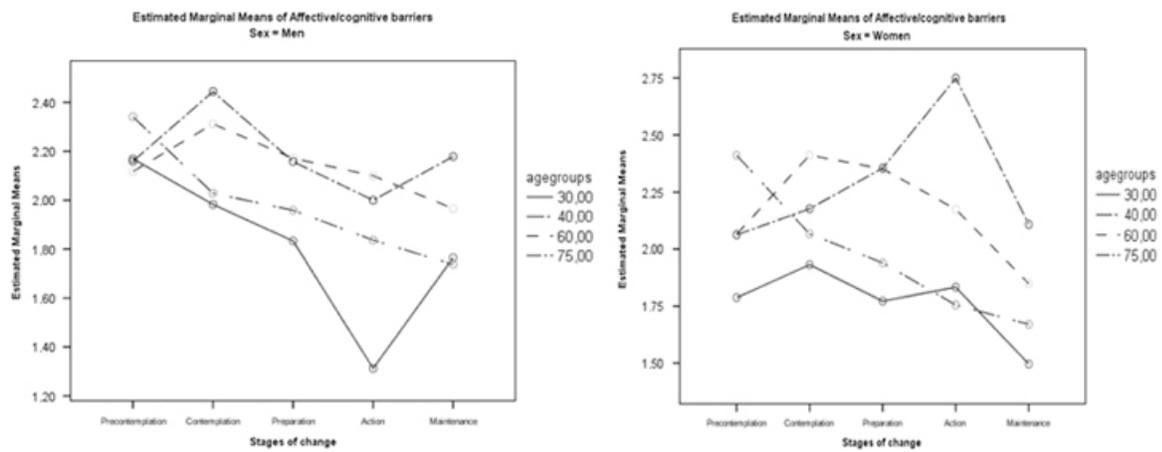


Figure 4. Affective/cognitive barrier mean scores for the age groups at the various stages of change for men and women.

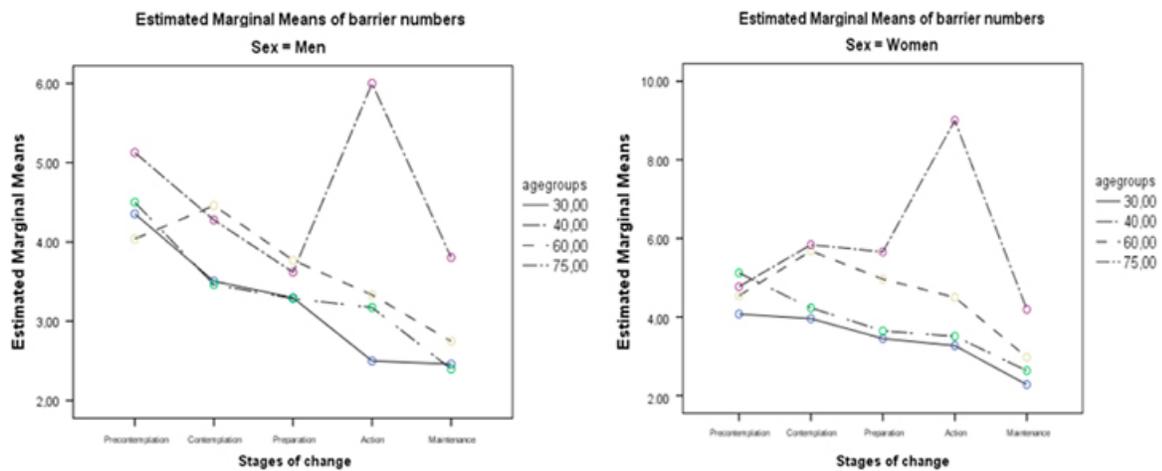


Figure 5. Number of barrier mean scores for the age groups at the various stages of change for men and women.

Health barriers (see Fig. 1)

For the health barriers, women generally scored higher than men at all stages of change apart from the maintenance stage. For both women and men, the age differences were significant between the two younger age groups and the two older age groups for all stages. Details from the ANOVA at the various stages were: the precontemplation stage ($F=16.63$, $P<0.001$ for women; $F=17.49$, $P<0.001$ for men), the contemplation stage ($F=17.04$, $P<0.001$ for women; $F=10.01$, $P<0.001$ for men), the preparation stage ($F=35.03$, $P<0.001$ for women; $F=10.44$, $P<0.001$ for men) and the maintenance stage ($F=3.83$, $P<0.05$ for women; $F=6.38$, $P<0.001$ for men).

The main differences between the stages in health barrier scores were between those at the precontemplation stage vs the contemplation/preparation/maintenance stages for the two older age groups of men, and between the precontemplation/contemplation stage vs the preparation/maintenance stage for the women. Details from the ANOVA between the stages were: for men ($F=3.97$, $P<0.01$ for 60-year-olds, and $F=4.27$, $P<0.01$ for the 75-year-olds), and for women ($F=3.78$, $P<0.01$ for 30-year-olds, $F=2.62$, $P<0.05$ for the 40/45-year-olds, $F=5.16$, $P<0.001$ for the 60-year-olds, and $F=5.45$, $P<0.001$ for the 75-year-olds).

Priority barriers (see Fig. 2)

The younger age groups scored higher than the older groups on the priority barriers at all stages of change, but for women the difference was not significant at the maintenance stage. The details from the ANOVA of age differences were: for men at the maintenance stage ($F=6.182$, $P<0.01$), for both women ($F=10.87$, $P<0.001$), and men ($F=30.75$, $P<0.001$) at the preparation stage; both women ($F=10.12$, $P<0.001$) and men ($F=7.65$, $P<0.001$) at the contemplation stage; and both women ($F=10.56$, $P<0.001$) and men ($F=10.64$, $P<0.001$) at the precontemplation stage.

The main differences in priority barrier scores across the stages were between those at the preparation stages vs the maintenance stage for the younger age groups and the 60-year-old men. The differences across the stages for the 75-year-olds were not significant. The details from the ANOVA across stages were: ($F=6.57$, $P<0.001$ for women 30 years, $F=2.81$, $P<0.05$ for men 30 years, $F=15.98$, $P<0.001$ for women 40 years, $F=10.49$, $P<0.001$ for men 40 years, $F=4.10$, $P<0.01$ for women 60 years, and $F=4.74$, $P<0.01$ for men 60 years).

Practical barriers (see Fig. 3)

The scores were generally lower for the practical barriers than the other types. Both women and men demonstrated age differences only at the preparation stage ($F=8.73$, $P<.001$ for women, and $F=3.98$, $P<0.01$ for the men). For the women, the scores were significantly higher at the contemplation stage than at the maintenance stage for the 30-year-olds ($F=3.01$, $P<0.05$) and the 60-year-olds ($F=5.29$, $P<0.001$), whereas for the 40/45-year-olds the difference was between the precontemplation stage and the maintenance stage ($F=7.72$, $P<0.001$). For the men, the difference in practical barrier scores across the stages was significant only for the 75-year-olds between the precontemplation stage and the maintenance stage ($F=5.21$, $P<0.001$).

Affective/cognitive barriers (see Fig. 4)

The differences in scores on the affective/cognitive barriers were primarily between the older and the younger age groups, with the older groups scoring higher, but there were some variations at the various stages. For the women, there were significant differences in the scores between the 30 vs the 40/45-year-olds at the precontemplation stage, between the two younger groups vs the two older groups at the contemplation stage, and the 30-year-olds vs the 40/45- and 60-year-groups at the preparation stage. At the maintenance stage, the 30-year group scored significantly lower than the 60- and 75-year-olds, and the 40/45-year group scored significantly lower than the 75-year-olds. The details from the analyses of age differences at the various stages for women were: precontemplation stage ($F=6.43$, $P<0.001$), contemplation stage ($F=9.11$, $P<0.001$), preparation stage ($F=31.63$, $P<0.001$) and maintenance stage ($F=7.55$, $P<0.001$).

For the men, the differences were between the two younger groups vs the two older groups at the contemplation and the preparation stage. At the maintenance stage, the difference was significant only between the 30- and the 40/45-year-olds vs the 75-year group. Details from the analyses of age differences at the various stages for men were: contemplation stage ($F=6.78$, $P<0.001$) stage preparation stage ($F=6.68$, $P<0.001$) and maintenance stage ($F=6.77$, $P<0.001$).

For cognitive/affective barriers scores across the stages for women, the differences were mainly between the precontemplation or the contemplation stage and the maintenance stage. There were no significant differences in the affective/cognitive barrier scores across the stages for either the 75-year-old women or men. The details from the analyses across the stages for women were: for the 30-year-olds it was between the contemplation and the maintenance stage ($F=4.85$, $P<0.01$), for the 40/45-year-olds between the precontemplation stage and all other stages, as well as between the maintenance stage and all other stages ($F=17.42$, $P<0.001$). For the 60-year-old

women, the differences were between the contemplation stage and the maintenance stage ($F=7.36$, $P<0.001$).

For the men, the differences in the affective/cognitive barrier scores across the stages were significant for all age groups apart from the 75-year group. The differences were mainly demonstrated between the precontemplation or contemplation stage vs the preparation stage and the maintenance stage. Details from the analyses across stages were: for the 30-year-olds ($F=2.89$, $P<0.05$), the 40/45-year-olds ($F=10.78$, $P<0.001$), and the 60-year-olds ($F=2.99$, $P<0.05$), and for the 60-year-olds ($F=2.88$, $P<0.05$) Table 4.

Table 4. Mean barrier scores

	Mean (SD)				<i>F</i>	df	<i>P</i>
	30 years	40/45 years	60 years	75 years			
Health							
Women	0.80 (0.75)	0.90 (0.77)	1.23 (0.75)	1.45 (0.77)	49.58	4	***
Men	0.72 (0.66)	0.81 (0.67)	1.07 (0.75)	1.30 (0.77)	35.50	4	***
Priority							
Women	1.56 (0.81)	1.44 (0.79)	1.22 (0.83)	1.03 (0.79)	24.59	4	***
Men	1.59 (0.79)	1.48 (0.80)	1.12 (0.82)	0.88 (0.80)	40.41	4	***
Practical							
Women	0.72 (0.60)	0.65 (0.59)	0.74 (0.66)	0.87 (0.72)	6.50	4	***
Men	0.72 (0.56)	0.67 (0.56)	0.59 (0.55)	0.59 (0.66)	3.24	4	*
Affective/cognitive							
Women	0.80 (0.68)	0.93 (0.75)	1.24 (0.85)	1.24 (0.81)	27.98	4	***
Men	0.91 (0.68)	0.94 (0.73)	1.16 (0.80)	1.21 (0.84)	10.47	4	***
Barrier number							

	Mean (SD)				<i>F</i>	df	<i>P</i>
	30 years	40/45 years	60 years	75 years			
Women	3.52 (2.45)	3.55 (2.55)	4.31 (3.16)	4.28 (3.37)	9.88	4	***
Men	3.33 (2.37)	3.23 (2.56)	3.57 (2.82)	3.68 (3.03)	2.50	4	*

*** Significant difference $P < 0.001$,

* Significant difference $P < 0.05$.

SD, standard deviation.

Number of reported barriers (see Fig. 5)

The general pattern in the reported number of barriers was that the two older age groups reported a higher number of barriers than the two younger age groups on most of the stages apart from the precontemplation stage. The number decreased significantly across the stages, with some variations among age groups and stages.

Relationship between barriers and engagement in physical activity

In order to explore the relationship between barriers and engagement in physical activity, we performed a logistic regression analysis with engagement in physical activity in leisure time (active or not) as the dependent variable and barriers, number of barriers, age and gender as the independent variables. The logistic regression analysis estimates the probability of an event to occur (e.g., being active or not) from a set of prediction variables. The scores on the barrier scales were divided into high and low scores based on the median score. The results are given in ORs, which are approximations of the likelihood to be active if the value of the predictor variables is increased by one unit (here from high, which is the reference category, to low).

The results from the logistic regression are shown in Table 5. For women, practical barriers and affective/cognitive barriers demonstrated a significant relationship with engagement in physical activity in leisure time with an OR of 1.3 for the practical barriers (range 1.0–1.5), and 1.6 for the affective/cognitive barriers (range 1.3–1.6), indicating that scoring low on these barriers increased the ORs for being active. For men, low-priority barriers demonstrated a small, but significant relationship with activity and gave slightly higher odds for being active (OR 1.3,

range from 1.0 to 1.6). Age was significantly associated with activity level for men, with increasing ORs for being active with decreasing age (OR 1.3, range from 1.0–1.6), but not for women.

Table 5. Odds ratios for engagement in physical activity by type of barriers for women and men (logistic regression)

Type of barrier scores	Odds ratio of being active (95% CI)	
	Women (N=2090)	Men (N=1791)
Low health barrier scores	0.9 (0.8–1.2) ^{NS}	0.9 (0.8–1.2) ^{NS}
Low-priority barrier scores	1.2 (0.9–1.5) ^{NS}	1.3 (1.0–1.6) [*]
Low practical barrier scores	1.3 (1.0–1.5) ^{**}	1.0 (0.8–1.3) ^{NS}
Low affective/cognitive barrier scores	1.6 (1.3–1.9) ^{***}	1.2 (1.0–1.5) ^{NS}
Low number of barriers	0.7 (0.6–1.0) ^{NS}	1.4 (0.9–1.9) ^{NS}
Age		
Low (30, 40, 45)	1.2 (0.9–1.5) ^{NS}	1.3 (1.0–1.6) [*]
High (75 and 60)	Reference group	Reference group

CI, confidence interval.

^{*} $P < 0.05$,

^{**} $P < 0.01$,

^{***} $P < 0.001$.

Discussion

The results demonstrated both gender and age differences in perceived barriers at the different stages of change that are important to address in order to motivate the various segments of the population to be physically active. The results also clearly linked the perception of barriers to the readiness to be physically active (the stages of change), even if some problems were detected with the preparation stage in particular.

Consistent with previous research, more women than men experienced higher numbers of barriers, and reported health barriers, practical barriers and priority barriers to be of importance (Jaffe et al., 1999; Sternfeld et al., 1999; Artazcoz et al., 2001). It is also consistent with other research that females report more health complaints than men (Grønningsæter et al., 1991). These results probably reflect differences in the life situations of women and men. It is documented that women still take the largest responsibility for family activities and housework (The Norwegian Center of Gender Equality, 2004), which may explain why women experience more priority barriers and practical barriers.

There were also significant age differences on all types of barriers. The differences were mainly between younger and older age groups, with 60- and 75-year-olds reporting stronger and more barriers than 30-, 40- and 45-year-olds, the only exception being the priority barriers where the younger scored higher than the older age groups. For the priority barriers, there were also relatively more young women at the contemplation stage of change. This may indicate that younger women and men are pressured for time by commitments such as job/education, children and establishment of a family. However, the 30-year-olds scored higher on priority barriers than the 40/45-year-olds, which may also indicate that it is related to new trends in leisure activities in our country, where the younger generation have developed more urban life styles and have replaced outdoor life with computer activities, film and café visits (Wold et al., 2000).

For affective/cognitive barriers, both genders scored higher with increasing age, meaning that thoughts and feelings toward physical activity become more of a barrier over the years. As this barrier included beliefs that they will not get anything out of being physically active, and did not see oneself as a physically active person, it may also have to do with what is considered proper behavior for the elderly, women in particular.

There were gender differences also in the distribution across stages of change. There were relatively higher percentages of men than women both in the precontemplation stage, and the maintenance stage, meaning that more men are either active or not, whereas more women seemed to have intentions to be active without being able to establish a regular activity pattern. The interaction effect between stages of change and gender showed that women at all stages of change, apart from the maintenance stage, had higher barrier scores, and thus felt more hindered by their barriers than their male counterparts. This means that apart from those who had established physical activity as a part of their lifestyle, the health problems and the practical life situations that females experienced presented more hindrances for being physically active,

whereas the men seemed to be active or inactive, with barriers having less influence. This may also indicate that it is especially important to address different types of barriers to help inactive women increase their activity level, whereas inactive men may need increased awareness and knowledge or other cognitive processes in order to change as suggested by the TTM of behavior change (Marcus & Forsythe, 2005).

The interaction between age and stages of change demonstrated a consistent general pattern of decreasing barrier scores with increased readiness for physical activity. This was as expected, and thus supports the validity of the measures used. The main exception was that the 75-year-olds did not demonstrate many differences in barrier scores across the stages of change. However, it is reasonable that 75-year-olds are more set in their thoughts and behavior patterns regardless of being precontemplators, preparers or regularly active, and that those who are active are more able to overcome the barriers they experience. The differences were mainly between the 60-year-olds and the 30- and 40-year-olds for all types of barriers, apart from the priority barriers, as discussed earlier. Although there were some variations, data indicated a general picture with lower barrier scores associated with higher stages of change, suggesting a link between readiness for involvement in physical activity and the perception of barriers.

The validity of the stages of the TTM has been questioned, and this seems to be supported by these data. The largest number of both women and men defined themselves as “preparers” (active, but not regularly, more than 40% for both genders), which is more than reported in other studies. It is also not quite in accordance with the results from the question about physical activity where 67.2% of the women and 68.9% of the men were rated as physically active. The explanation for this may be that the preparation stage does not necessarily include any intention to change. It may be that people are relatively active but at irregular intervals, but with no intention to become more active. The difference between this stage and the maintenance stage may therefore be a question of how people define regular physical activity: having an active lifestyle vs exercising according to a fixed schedule. The fact that the difference between the maintenance and the preparation stage was not significant for most of the barriers indicates that this stage may need further clarification. This supports the development of the stages of change model suggested by Miilunpalo et al. (2000), who divided the preparation stage into two new stages: “ongoing occasional activity” and “preparation to change.”

The highest health barrier scores were among the 60- and 75-year-old precontemplators among the men, and both the precontemplators and the contemplators among the women. This means that it is important to establish and demonstrate ways of being active in spite of health problems for the older age groups. Practical barriers were less important and demonstrated few differences

among the various groups. This may indicate that people in these two counties experience few practical barriers if they want physical activity. This makes sense because the counties in question have mostly smaller towns and plenty of space for walks, skiing and other activities that have long traditions in this culture. The younger age groups scored the highest on the priority barriers, and the difference was mainly between those at the maintenance stage vs the other stages. For these groups, it may be important to approach the inactive via cognitive processes that may help change their priorities, by using role models, life style and decision balance procedures.

For the affective/cognitive barriers, the 40/45-year-old precontemplators and the elderly contemplators scored the highest. Considering the content of this scale, it may be that among the 40/45-year-olds, it is a matter of identity/life style combined with lack of conviction about the value of physical activity. They may not yet experience that it makes any difference healthwise, and therefore do not think about changing. The elderly may realize the health value in general, and therefore consider the possibility, but do not feel it is going to help them personally.

Those in the action stage demonstrated scores that deviated from the general pattern for the other stages. They had higher scores on several of the barriers than the preparers and the contemplators. However, there were few people in the action stage, and so individual scores are given more weight than at the other stages, which may account for the atypical results. However, it may also be that they had started to exercise only recently, had not yet made it a routine, and therefore the barriers may be experienced as more important. This is in line with earlier research demonstrating that around half of those who try to start exercising drop out during the first 6 months (Pate et al., 1995). Although few people were at the action stage, the higher barrier scores for this group indicate that work to reduce the barriers may be especially important for people who have recently started to exercise in order to prevent dropout.

Logistic regressions did not demonstrate a strong relationship between the reported barriers and actual engagement in physical activity. It may seem that with the number of physically active persons in this country, quite a few manage to overcome some of the barriers they experience. However, low scores on practical and affective/cognitive barriers gave significantly lower ORs for engagement in physical activity for women, and low scores on priority barriers and lower age gave significantly lower ORs for engagement in physical activity for men. This again shows the difference between the experiences of men and women in relation to being physically active, and underlines the importance of different approaches in helping people overcome their barriers.

This study has some limitations that should be considered. Some of the barrier scales (the priority scale in particular) need improvement and further validation in order to be interpreted with more certainty. However, the results in this study demonstrated reasonable face validity (e.g., younger people report more priority barriers). Another problem, usual in this type of research, is the criteria for defining physically active vs non-active, with the limited information given in this type of population study, and in particular when it is measured by self-report in a questionnaire. Unclear delimitations between those physically active or not may either exaggerate or diffuse some differences between the groups. This problem also becomes apparent in the discussed problem with the definition of the preparation stage. On the other hand, in real life there are difficulties in knowing what type of activity pattern is best for different health benefits.

Perspectives

The current results provide information on perceived barriers and activity patterns of Norwegian adults across age groups in one geographical area where the cultural differences are minimized. The results demonstrated both gender and age differences in perceived barriers at the various stages of change that are important to address in order to help increase the activity level in different segments of the population. The population of middle-aged adults is neglected in the physical activity research, and the current results provide some insights into changing perceptions and activity across the middle-age adult years. The gender differences demonstrate the need to consider the situations of men and women separately.

The results clearly linked the perception of barriers to the readiness to be physically active (the stages of change), and demonstrated that women in particular seem to have intentions to be physically active without being able to establish a regular physical activity pattern. Finding ways to overcome barriers for these women may be a fruitful way of increasing the activity level.

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