

PHYSICAL ACTIVITY ACCORDING TO ETHNIC ORIGIN IN FINNMARK COUNTY, NORWAY. THE FINNMARK STUDY

ABSTRACT

Study objective: Is there a difference in self-reported physical activity between the Norse and Sami population, and could the activity levels have been differently reported in the two ethnic groups? **Design:** Cross-sectional, population-based study. In addition, we performed interviews to validate the questions used in the survey to measure physical activity. **Setting:** Finnmark County, Norway. **Participants:** 866 men and 860 women of Sami origin, and 4105 men and 3948 women of Norse origin. Attendance rate 77.7%. In addition, we interviewed ten Sami-speaking and seven Norwegian-speaking persons about physical activity. **Main results:** Among men, the two ethnic groups differed in leisure time physical activity ($\chi^2 = 11.462$, $p = 0.009$). Sami women were less active than Norse women in leisure time ($\chi^2 = 21.568$, $p < 0.001$). Both Sami men and women were significantly more active during work than Norse persons ($\chi^2 = 93.819$, $p < 0.001$ for men and $\chi^2 = 59.323$, $p < 0.001$ for women). **Conclusions:** Sami men and women were more physically active at work and had a higher total physical activity score than Norse men and women. The variables used to measure different aspect of physical activity seem to be valid in a diverse ethnic population. (*Int J Circumpolar Health* 2002; 61: 189-200)

Keywords: Physical activity, ethnicity

Physical activity seems to act protectively with regard to future risk of cardiovascular disease and death (1-8). It is well established that physical activity improves lipid profile (9-13) and carbohydrate metabolism (13,14), reduces plasma fibrinogen (15-17), lowers blood pressure (8,18-20) and induces weight loss (21). The type and intensity of physical activity needed to ensure health benefits is still unsettled (13,22).

Finnmark is the northernmost county in Norway. The indigenous Sami population constitutes about twenty percent of a total population of approximately 75000 (23). The Samis have a different language and cultural background than the Norse. Agriculture, reindeer herding, fishing, hunting, use of wild berries and other natural resources

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es, constitute the fundament of the traditional Sami society. Until the middle of the 20th century, many Sami lived as nomads with their reindeer herd, and their work was hard manual labour (24,25). More recently, the reindeer industry has become motorised. In the 1980's, 30 percent of the Sami population were dependent on the agriculture and reindeer industry, compared to only 6 percent in the general Norwegian society (26). Previous studies from Finnmark County have reported inconsistent findings regarding self-reported physical activity in the different ethnic groups (27,28). It is possible that the questions used may not have detected existing ethnic differences in the actual activity levels. The two ethnic groups might have a different understanding of leisure time and work activity, and the two languages might differ in their ability to describe the same underlying activity level.

The aim of this study was to investigate whether there were differences in self-reported physical activity between Norse and Sami subjects in Finnmark, in a cross-sectional, population-based study. In addition we wanted to explore whether there were any indication that activity levels could have been differently reported by Sami and Norse subjects.

MATERIAL AND METHODS

A population-based survey of cardiovascular risk factors and disease was performed in 1987-1988 in Finnmark County. The National Health Screening Service conducted the survey in collaboration with the University of Tromsø and local health authorities. This was the third survey in the Finnmark Study, which started in 1974. The study design includes repeated population health surveys to which total birth cohorts and samples were invited. The Norwegian Data Inspectorate approved the study.

Invited to the third survey in Finnmark were all resident men and women aged 40-62 years. In addition, all those aged 20-39 years who had been invited to the second survey in 1977 and were still living in Finnmark, together with a 10% random sample of men and women in the same age group were invited. A total of 17864 (77.7%) men and women attended the survey. Further details on study design have been published previously (29-31).

Briefly, all subjects were invited by a personal letter, which included a one-page questionnaire. In four municipi-

palities with a high proportion of Sami inhabitants, the questionnaire was sent in both a Sami and a Norwegian version. Family history of coronary heart disease, prevalent cardiovascular disease and diabetes, level of physical activity at work and during leisure time, ethnicity, and smoking habits were covered. The questionnaire was filled in at home, but trained nurses checked the questionnaire for inconsistencies at the survey and measured the subjects' height and weight. Heart rate and blood pressure was measured by the Dinamap method (32) (an automatic oscillometric method). Three measurements were taken with intervals of one minute, and the lowest value is used in the analyses. Irregular heart rate or extremely high blood pressure necessitated in a few instances the use of a sphygmomanometer. A non-fasting blood sample was collected and analysed for serum total cholesterol and triglycerides at Ullevål hospital, Oslo.

The questionnaire used these questions to define ethnicity: «Are two or more of your grandparents of Sami origin?» and «Are two or more of your grandparents of Finnish origin?» Based on the answers, "yes", "no" and "don't know", the subjects were grouped into five ethnic categories: Finnish (Finnish: yes; Sami: no or don't know), Sami (Sami: yes; Finnish: no or don't know), Norse (Finnish: no; Sami: no), Finnish/Sami (Finnish: yes; Sami: yes) and unknown (none of above). This classification is identical to the description given in the report from the first cardiovascular study in Finnmark (33).

Among men and women, 12.6% were of Sami origin while 59.6% of the men and 57.8% of the women were of Norse origin. The remaining were of Finnish, mixed, or unknown ethnicity. Eligible for the present study were those defined to be of Sami or Norse origin.

We excluded subjects with missing information about ethnicity (n= 4136) and subjects with missing information about leisure time physical activity (n= 11). Hence, the study population consisted of 866 men and 860 women of Sami origin, and 4105 men and 3948 women of Norse origin. More than 50% of the Samis lived in the traditional Sami municipalities, where the reindeer industry dominant.

Assessment of physical activity

Respondents were asked to consider four response alternatives and tick the one that fitted best. If two or more

alternatives were ticked, a trained nurse corrected the questionnaire at the place of examination after further information from the person. The alternative indicating the highest degree of physical activity was chosen. Information on physical activity during leisure time and work referred to the last year.

Physical activity level during leisure time was graded 1 to 4:

1. Sedentary: Reading, watching TV, or other sedentary activities.
2. Moderate: Walking, bicycling, or moving around in other ways at least 4 hours a week (including walking or cycling to place of work, walks on Sundays etc.).
3. Intermediate: Participating in recreational sports, heavy garden work etc. (note: duration of activity at least 4 hours a week).
4. Intensive: Participating in hard training or athletic competitions regularly and several times a week.

Physical activity level at work was graded 1 to 4:

1. Sedentary: Mostly sedentary work (e.g. office work, watchmaker, mounting of instruments).
2. Moderate: Work with much walking (e.g. shop assistant, light industrial work, education)
3. Intermediate: Work with extensive walking and lifting (e.g. postman, heavy industrial work, construction)
4. Intensive: Heavy manual labour (e.g. forestry work, heavy construction work).

Definition of total physical activity score:

We constructed a new variable that was the sum of physical activity during leisure time and work. The minimum possible score was 2 and the maximum obtainable score was 8. A low physical activity score was defined as two to four while five to eight defined a high physical activity level.

Qualitative study of questionnaire interpretation

We performed in depth interviews in order to investigate whether self-reported physical activity could have been differently reported by Norse and Sami respondents. An interview guide was made, based upon questions about

physical activity at work and in leisure time. We made a purposeful sampling (34,35) of ten Sami-speaking persons who could converse in Norwegian, five men and five women, aged 36 - 73 years living in the predominantly Sami area in Finnmark. The Samis had the following background: Three of them were engaged in reindeer herding, two were farmers, two were carpenters, one was a nurse, one was a caretaker and one was a consultant. In addition we interviewed three Norse fishermen and four Norse farmers, aged 27 - 67 years, of whom one was a woman. The interviews were performed in 1999 by the first author and averaged approximately thirty minutes. With the written consent from the respondents, all conversations were taped and transcribed.

In addition we had the Sami version of the questionnaire backtranslated into Norwegian by a professional translator, who had not seen the original Norwegian version.

Data analysis

We examined levels of physical activity among men and women by ethnic group, using the chi-square test. All analyses were sex-specific. In women, we combined leisure time physical activity group three (intermediate) and four (intensive) because there were only four Sami and 20 Norse subjects in the most intensive group. Two-sample t-tests were used to compare means. Analysis of covariance was used to examine the associations between different levels of physical activity in leisure and work and exposure variables. The body mass index (BMI) was computed as the weight in kilograms divided by the square of the height in meters. Numbers of subjects in the tables vary slightly because of missing values. All significance tests were two-tailed and the significance level was chosen at 5%. The SPSS statistical package version 8.01 was used. The figures were made in Fig P, version 2.98.

RESULTS

As shown in Table 1, the proportion of smokers and mean values of BMI, systolic blood pressure and triglycerides were similar in Norse and Sami men, but serum cholesterol was 0.16 mmol/l higher among the Samis (95% confidence interval (CI) of difference = 0.06 - 0.25). Sami men had 1.7 beats/minute lower heart rate (CI of difference =

Table I. Characteristics of study population. The Finnmark Study 1987.

Variables	Men				Women			
	Norse (n=4105)		Sami (n=866)		Norse (n=3948)		Sami (n=860)	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD
Age (y)	47.2	9.1	47.2	9.1	46.8	9.6	46.7	9.5
BMI (kg/m ²)	25.8	3.3	25.9	3.2	25.2	4.3	26.7	4.8
Heart rate (beats/min)	73.0	13.4	71.3	13.1	76.5	12.8	75.4	12.4
Diastolic blood pressure (mmHg)	81.1	10.8	80.2	11.5	77.2	10.7	78.0	11.7
Systolic blood pressure (mmHg)	134.1	16.5	135.0	17.2	128.1	18.6	131.3	21.1
Cholesterol (mmol/l)	6.47	1.26	6.63	1.32	6.46	1.40	6.66	1.42
Triglycerides (mmol/l)	2.08	1.48	2.09	1.41	1.54	0.96	1.71	1.15
Daily smokers (%)	51.9		50.1		45.9		38.4	
Antihypertensive treatment (%)	6.7		5.5		7.9		7.8	

0.7 – 2.7), compared to Norse men. Fewer Sami than Norse women were daily smokers ($\chi^2 = 16.078$, $p < 0.001$) (Table I). BMI, systolic blood pressure and serum lipids were higher, but heart rate was 1.1 beats/minute lower (CI of difference= 0.1 – 2.0) in Sami women as compared to Norse women.

Norse and Sami men differed in leisure time physical activity ($\chi^2 = 11.462$, $p = 0.009$) (Table II). The percentage of Sami men was lower in the moderate group, but higher in the sedentary, intermediate, and intensive groups. Sami women were less active in leisure time than Norse women ($\chi^2 = 21.568$, $p < 0.001$).

Sami men and women were more active at work than Norse men and women ($\chi^2 = 93.819$, $p < 0.001$ for men

Table II. Physical activity during leisure-time by ethnic groups and sex. The Finnmark Study 1987.

Sex	Ethnicity	Total n	Activity level			P-value	
			Sedentary n (%)	Moderate n (%)	Intermediate n (%)		Intensive n (%)
Men	Norse	4105	1037 (25.3)	2216 (54.0)	771 (18.8)	81 (2.0)	0.009
	Sami	866	240 (27.7)	418 (48.3)	182 (21.0)	26 (3.0)	
Women	Norse	3948	975 (24.7)	2676 (67.8)	297 (7.5)		0.000
	Sami	860	269 (31.3)	512 (59.5)	79 (9.2)		

Active = intermediate and intensive group

Table III. Physical activity at work by ethnic groups and sex. The Finmark Study 1987.

Sex	Ethnicity	Total n	Activity level				P-value
			Sedentary n (%)	Moderate n (%)	Intermediate n (%)	Intensive n (%)	
Men	Norse	4103	1640 (40.0)	1144 (27.9)	878 (21.4)	441 (10.7)	0.000
	Sami	864	265 (30.7)	210 (24.3)	197 (22.8)	192 (22.2)	
Women	Norse	3947	1263 (32.0)	1952 (49.5)	679 (17.2)	53 (1.3)	0.000
	Sami	859	208 (24.2)	432 (50.3)	179 (20.8)	40 (4.7)	

and $\chi^2 = 59.323$, $p < 0.001$ for women respectively) (Table III).

When we combined physical activity in leisure and work into a total physical activity score, Sami men and women had a higher proportion in the high activity group than the Norse (45.6 % vs 33.8 %; $\chi^2 = 43.378$, $p < 0.001$ for men, and 24.3 % vs 18.5 %; $\chi^2 = 14.993$, $p < 0.001$ for women, respectively) (not shown). The main contributor to the difference in total physical activity between Norse and Sami came from physical activity at work.

In both sexes and ethnic groups, age-adjusted values of heart rate and BMI decreased significantly across levels of leisure-time physical activity (Fig. 1 and 2).

Heart rate in Norse men was 75.5 beats/minute in the sedentary group and 59.8 beats/minute in the intensive group, and 72.8 beats/minute and 59.4 beats/minute, respectively, in Sami men (Fig 1). In women, heart rate differed from 78.2 beats/minute to 73.5 beats/minute and from 76.5 beats/minute to 71.8 beats/minute in Norse

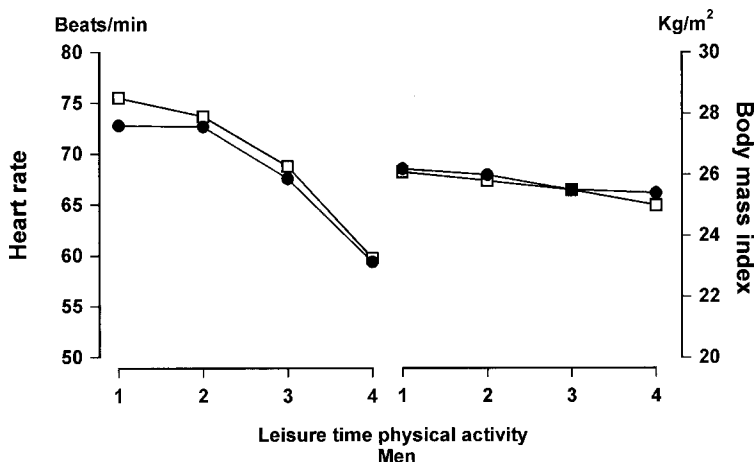


Fig. 1. Age-adjusted values of heart rate and body mass index levels across levels of leisure time physical activity in men. Black circles represent Sami men and open squares represent Norse men.

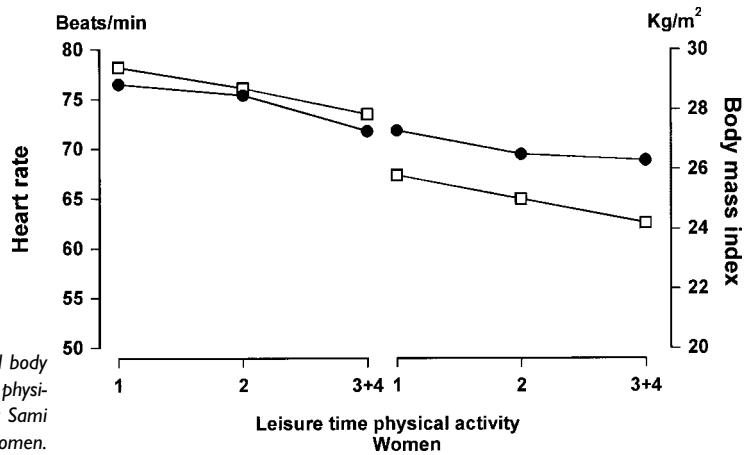


Fig. 2. Age-adjusted values of heart rate and body mass index levels across levels of leisure time physical activity in women. Black circles represent Sami women and open squares represent Norse women.

and Sami women, respectively (Fig 2). In men, BMI was 26.1 kg/m² in the sedentary group and 25.0 kg/m² in the intensive group among the Norse and 26.2 kg/m² and 25.4 kg/m², respectively, among the Samis (Fig 1). BMI in women differed from 25.8 kg/m² in the sedentary group to 24.2 kg/m² in the active group among the Norse and likewise among the Sami from 27.3 kg/m² to 26.3 kg/m² (Fig 2).

Sami men had a significantly lower heart rate across levels of physical activity at work, compared to Norse men ($p < 0.001$) (Fig 3). In the intensive group, Sami men

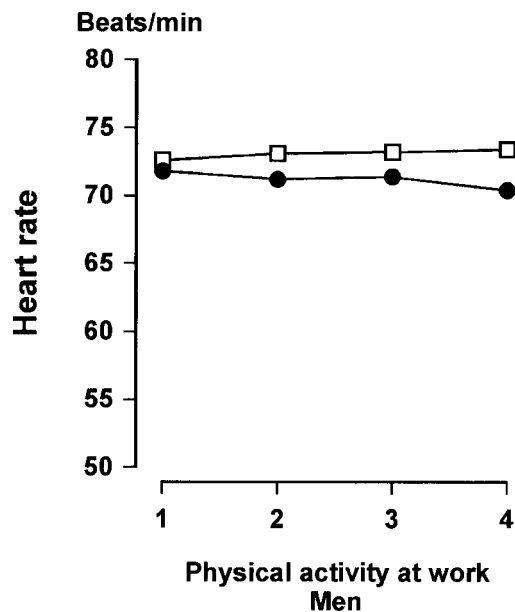


Fig. 3. Age-adjusted values of heart rate across levels of physical activity at work in men. Black circles represents Sami men and open squares represent Norse men.

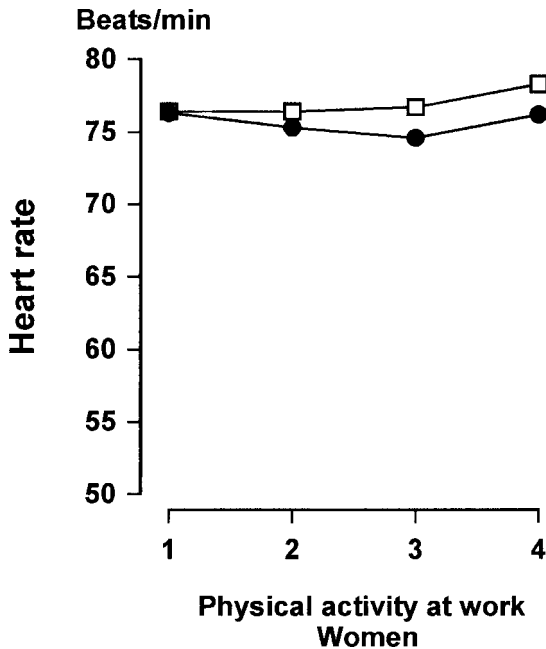


Fig. 4. Age-adjusted values of heart rate across levels of physical activity at work in women. Black circles represents Sami women and open squares represents Norse women.

had a lower heart rate of 3.0 beats/minute. Sami women had a nonsignificantly lower heart rate of 2.1 beats/minute ($p = 0.082$) in the intensive group (Fig 4).

Interpretation of physical activity by Sami and Norse subjects

Employed Sami and Norse subjects with defined working hours made a strict distinction between work and leisure time. Local Norse fishermen did the same, but they defined their leisure time to be only in the weekend. They worked hard during the week and claimed to have almost no spare time. Samis living as reindeer herdsman, and farmers in both ethnic groups did not make a clear distinction between work and leisure time activity. Most of their time was utilised in activities for daily living and they had almost no defined leisure time. Some of the Samis said that fishing, hunting and berry-picking were neither defined as work nor leisure time activities, but something in between. It was part of their lifestyle to harvest from nature. This point of view seemed to be present in only Sami farmers and reindeer herdsman. Years ago, some of them sold berries as a contribution to their family income. In that context berry-picking was defined as work. Samis with regular working hours defined fishing, hunting and

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berry picking as leisure-time activity. The Norse, independent of occupation, did the same, but some of the Norse interviewees said that berry-picking formerly was a part of the family income.

The back-translation from Sami to Norwegian did not differ substantially from the original questionnaire.

DISCUSSION

In this population-based study from Finnmark County, Norway, we found that Sami men and women were more physically active than the Norse population. The ethnic difference in activity was mainly due to a higher activity level at work in the Sami population. The qualitative part of this study raised the possibility that there may even have been an underreporting of leisure-time physical activity, especially among Samis with occupations related to agriculture and reindeer herding.

We do not know the attendance rate in each ethnic group, since ethnicity was self reported at the screening. However, the overall attendance rate in the study population was high, and similar in the Sami municipalities and other municipalities.

There are other potential sources of bias in this study that need to be considered. First, questions about physical activity were based upon recall over the last 12 months. In an evaluation of physical activity assessment methods (36), the same questions as those used in the present survey, scored 8 on a scale from 0-14. (The maximum score given was 10). We have no reason to believe that recall of physical activity was expressed differently in the two ethnic groups. Second, different interpretations of questionnaire linguistics have been offered as one explanation for geographical differences in self-reported health in Norway (37). The questionnaire in this study had been translated from Norwegian into Sami. The reverse translation of the questions on physical activity showed a strong consistency with the original questionnaire. However, questions about physical activity in this survey provided broad response categories with distinct cues about desired information. Traditional Sami activities, which can be physically strenuous, were neither specified in the question on leisure-time activity nor in the question on work-related activity. In contrast, those activities specified, such as heavy gardening

and forestry work, may be less relevant for indigenous inhabitants in the Arctic region.

The interviews, on the other hand, indicated that farmers in both ethnic groups and Sami reindeer herdsman did not make a strict distinction between work and leisure time. In the interviews, Sami farmers and reindeer herdsman classified fishing, hunting and berry picking as self-support and something in between work and leisure time. It is possible that a lack of distinction between work and leisure time could have influenced the way they answered questions about physical activity. Furthermore, since the proportion of inhabitants engaged in the agriculture and reindeer industry is higher among the Samis than the Norse (26), this may have introduced an ethnic response bias to the self-reported physical activity levels according to the questionnaire. However, the questionnaire survey and the interviews were performed 11 years apart, and it is impossible to assess directly whether and to what extent such a bias actually did occur. On the other hand, heart rate and BMI were lower in the two ethnic groups and in both sexes with higher leisure time physical activity, and the relation between heart rate and BMI and leisure-time physical activity did not differ between the ethnic groups. The variable "Physical activity during leisure-time" thus seems to be a useful assessment tool also in this population with possible ethnic-related diverging understanding of the survey questions. This is in accordance with findings in other study populations (9,10,19).

A high level of work-related physical activity is often a marker of unskilled manual labour and is commonly used as an indicator of low social class (38), while endurance exercise training is known to decrease heart rate at rest and to increase heart rate variability (39,40). The proportion of subjects in our study who classified themselves as having intermediate and intensive physical activity at work, was higher among the Samis than in the Norse group. Compared to industrial workers, the work of Sami farmers and reindeer herdsman probably involves a higher proportion of aerobic activity and less static work. Thus, it is possible that Samis achieve health benefits through work-related physical activities. To explore this hypothesis, we studied the association between physical activity levels at work and heart rate, using heart rate as an indirect measure of fitness. Overall, Samis of both genders had lower heart rate compared to Norse, although significantly only

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in men. The ethnic difference was higher in the intensive group. The lower heart rate among Sami men and women could be a result of a higher aerobic activity at work and better fitness, compared to the Norse. This remains, however, a speculation.

BMI was similar in Sami and Norse men and significantly higher in Sami women as compared to Norse women in our study. In a study from Finnmark in 1999 (41), the dietary pattern and nutrient intake among Samis were investigated and compared with a group of Norse. The Samis consumed more meat, fat, table sugar and coffee and less fruits and vegetables. The mean energy intake was significantly higher among Sami (12646 KJ) than Norse (10501 KJ) men, but BMI was similar. The authors concluded that it is likely that Sami men have a lifestyle with a higher degree of physical activity and energy expenditure than men of Norse origin. Our findings of higher total physical activity score, especially among men of Sami origin, but similar BMI in Norse and Sami men, are consistent with that theory.

In summary, we found that Sami men and women were more physically active at work and therefore had a higher total physical activity score than Norse men and women. Even if the qualitative part of our study illustrated difficulties in generating questions in one cultural context and applying it in another cultural setting, the physical activity variables seemed to be valid in a diverse ethnic population.

A c k n o w l e d g e m e n t

Thanks to statistician Tom Wilsgaard for his support. A special thanks to The National Health Screening Service who were responsible for organisation and data collection. Source of funding: "Medisinsk forskning i Finnmark" - a public fund

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