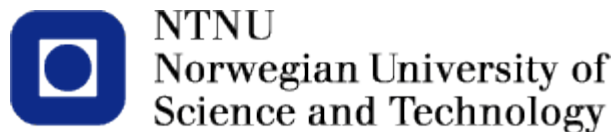


# **The association between physical activity, mental health, and personality: The HUNT study**

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# 1.0 Abstract

**Background:** Previous studies have suggested that physically active behavior is associated with reduced symptoms of depression and anxiety. It is uncertain whether this relationship is affected by a third underlying factor. The aim of this study is to evaluate the association between physical activity (PA), symptoms of depression and anxiety, and personality traits.

**Methods:** During the period 2006–2008, the third phase of a population-based health survey (HUNT 3) was conducted in the county of Nord-Trøndelag in Norway. In total, 38,743 subjects aged 19 years or older completed the self-reported questionnaires on PA, mental health problems and personality in HUNT 3, of which 21,722 (56.1%) were women and 17,021 men (43.9%). The Hospital Anxiety and Depression Scale (HADS) was used to detect case-level symptoms of depression and anxiety, while the Eysenck Personality Questionnaire (EPQ) was used to measure the stable and consistent personality dimensions extroversion and neuroticism. Analysis focused on the odds of HADS-defined depression and anxiety comparing different levels of PA. Also, the linear trend between PA and personality scores was assessed.

**Results:** The prevalence of depression and anxiety scores above 8 was 9.5% and 14.1% respectively. Distribution of HADS-defined anxiety, scored extroversion, and scored neuroticism was higher among women compared with men, while HADS-defined depression had a higher distribution among men. The results from this cross-sectional study suggest that moderately physically active individuals have significantly lower odds of symptoms of depression and anxiety compared with less physically active individuals ( $p < 0.05$ ). High PA had no further effect on mental health. A lower risk of HADS-defined anxiety was found among physically active women in comparison with physically active men. In the association with personality, lower levels of PA had a significant negative linear trend than high PA in relation to extroversion score ( $p < 0.01$ ) and a significant positive linear trend with lower PA than high PA in relation to neuroticism score ( $p < 0.01$ ). Small and consistent effects of the association between PA and scored extroversion and neuroticism were observed among both women and men.

**Conclusion:** Subjects reporting regular PA were less likely to report symptoms of depression, but only physically active women were associated with lower symptoms of anxiety. Personality may be an important underlying factor in explaining this association, but other possible mechanisms might be more elucidating.

## 2.0 Introduction

Mental health problems are characterized by frequent negative symptoms or ailments which significantly affect an individual's ability to function on a daily basis (Biddle & Mutrie, 2008). The present study focuses on the two most common mental health problems in Norway, namely depression and anxiety (Norwegian Institute of Public Health, 2009). Depression is defined as “the emotion of sadness, and in addition feelings of sorrow, hopelessness, gloom, lack of energy, and anhedonia” (Bjelland, 2004, p. 13). Anxiety is defined as “the emotion of fear involving feelings of tension, worry, apprehension, and dread for something considered dangerous in the future” (Bjelland, 2004, p. 13). The World Health Organization (WHO) predicts that by 2020 depression will be the second most common cause of mortality and the most incapacitating problem in the world (Murray & Lopez, 1997). The consequences of anxiety disorders may be similar to those related to depression (Myers et al., 1984; Norwegian Institute of Public Health, 2009). Further, the consequences of depression and anxiety may vary in degree of severity due to variations in intensity and duration of the symptomatic conditions (Biddle & Mutrie, 2008). During the last 20 years, studies of depression and anxiety in epidemiological health surveys have received greater focus due to the large numbers of people suffering from these disorders in modern society (Biddle & Mutrie, 2008). Possible links have been found between somatic health condition and the risk of mental health problems, but many underlying factors may affect this association (Pettit, Grover, & Lewinsohn, 2007).

### 2.1 Prevalence of depression and anxiety

Approximately one-third of the adult Norwegian population has suffered from a mental health problem at some point in time (Norwegian Institute of Public Health, 2011). A study of a Norwegian urban population (N = 2066) found a 12-month prevalence of 7.3% with major depression, but only the occurrence of separate anxiety disorders were reported (Kringlen, Torgersen, & Cramer, 2001). In comparison, the 12-month prevalence of depression and anxiety has been reported to be 9.5% and 17.2% respectively in a US population (Kessler et al., 2005) and 4.5% and 12.7% in a cross-European population (Alonso et al., 2004). Differences in sample characteristics, diagnostic tools, and measurement techniques may explain the variations in prevalence between the studies (Norwegian Institute of Public Health, 2009).

## 2.2 Physical activity and mental health problems

In this study PA is defined as “all bodily movement procedures by muscle action that increases energy expenditure” (McArdle, Katch, & Katch, 1996, p. 632). A physically active lifestyle has been found to be an effective way of improving fitness and overall health (Haskell et al., 2007). Conversely, the absence of a physically active lifestyle can adversely affect health and well-being, increasing the risk of somatic health problems such as cardiovascular diseases, hypertension, diabetes mellitus, osteoporosis, and some types of cancer (US Department of Health, 1997). In addition, regular PA is known to have a positive impact on mental health (Biddle & Mutrie, 2008; Strôhle, 2009). A number of meta-analyses of intervention studies of the effect of exercise training have revealed that exercise may have a significant moderate to high anti-depressive effect (Byrne & Byrne, 1993; Lawlor & Hopker, 2001; McDonald & Hodgdon, 1991; North, McCullagh, & Tran, 1990) and a small to moderate anxiolytic effect (Byrne & Byrne, 1993; Long & van Stavel, 1995; McDonald & Hodgdon, 1991; North et al., 1990; Petruzzello, Landers, Hatfield, Kubitz, & Salazar, 1991).

However, extending the results from intervention studies to “the real world” could lead to divergent outcomes, and therefore observational designs may be preferable when studying associations in populations as a whole (Rothman, 2002). Previous results from large-scale observational studies show that leisure-time PA has a small to moderate effect in reducing the risk of depression (Augestad, Slettemoen, & Flanders, 2008; De Moor, Beem, Stubbe, Boomsma, & De Geus, 2006; De Moor, Boomsma, Stubbe, Willemsen, & de Geus, 2008; Goodwin, 2003; Mutrie & Hannah, 2007; Harvey, Hotopf, Overland, & Mykletun, 2010; Hassmén, Koivula, & Uutela, 2000; Mikkelsen et al., 2010; Teychenne, Ball, & Salmon, 2008; Thorsen et al., 2005), but results relating to anxiety are equivocal (De Moor et al., 2006; De Moor et al., 2008; Goodwin, 2003; Mutrie & Hannah, 2007; Harvey et al., 2010; Stephens, 1988; Thorsen et al., 2005). For instance, following a cross-sectional study involving a large sample (N = 20,207) of the Norwegian population, Thorsen et al. (2005) reported that reduced symptoms of depression and anxiety were associated with increased levels of PA. However, the association between PA and symptoms of anxiety did not persist after the adjusted analyses. Few observational studies have focused on determining whether PA may have an anxiety-reducing effect and inconsistency in their results makes it doubtful whether there is a relationship between PA and anxiety (Biddle & Mutrie, 2008).

## 2.3 Physical activity and personality

A few lifestyle related factors have consistently been found to be associated with depression and anxiety; smoking, education, social class, social support, marital status, alcohol (Folkehelseinstituttet, 2009), and BMI (Scott et al., 2007). Also, heritable genetic factors are claimed to affect both exercise behavior (Stubbe et al., 2006) and depressive and anxious symptoms (Boomsma et al., 2000), and growing evidence has been found that during the course of life people have enduring and consistent biological dispositions which influence their “interactions with, and adaptations to, the intrapsychic, physical, and social environments” (Buss & Larsen, 2005, p. 4). In recent years there has been a progress towards a higher-order trait classification which includes basic personality traits ranging from two to seven traits (Buss & Larsen, 2005). The Eysenck Personality Questionnaire (EPQ) is one of the most established models in exercise research and has operated with two basic personality traits: extroversion (i.e., a tendency to be impulsive, sociable, assertive, energetic, seek excitement, and experience positive affect) and neuroticism (i.e., a tendency to be emotionally unstable, angry, hostile, anxious, self-conscious, and vulnerable) (Eysenck & Eysenck, 1975).

A health-behavior model could be used to explain the general associations between personality traits and somatic and mental health, whereby personality affects individual perceptions of the benefits of and barriers to performing a particular health behavior in response to the perceived risk of a particular negative health outcome (Janz & Becker, 1984). It is well known that neuroticism and extroversion are highly correlated with depression and anxiety (Klein, Kotov, & Bufferd, 2011; Middeldorp et al., 2005; Tambs, 2009), but might also directly or indirectly influence health maintenance behaviors such as PA participation through several pathways (Pettit et al., 2007). A meta-analytic review of studies published between 1969 and 2006 revealed that physically active individuals scored higher on extroversion and lower on neuroticism than physically inactive individuals (Rhodes & Smith, 2006), but the weakness of the association raises questions regarding the effect of personality on PA participation.

Few studies have investigated how personality influences the relationship between PA and mental health problems in the general population (De Moor, et al., 2006; De Moor, et al., 2008; Emery, Huppert, & Schein, 1996; Hassmén, et al., 2000). To my knowledge, only one population based observational study has investigated the association between PA and personality with both depression and anxiety. In a large (n = 19,288) Netherlands twin population aged 18-50 years, De Moor et al. (2006) detected that regular exercisers scored lower on symptoms of mental health problems, lower on neuroticism and higher on extroversion than irregular

exercisers. The association was significant irrespective of gender and age. Detailed information of intensity, duration and frequency is needed for establishing a reliable pattern of PA with mental health problems and personality. Furthermore, since former studies have not identified any gender differences in the relationship between PA, mental health problems, and personality, a stratified analysis by gender in relation with detailed self-reported information on PA may play an important role in discovering those differences.

## **2.4 The aims of the study**

The purpose of this study is to investigate the cross-sectional association between leisure-time PA, mental health, and personality in a population-based observational survey in Norway (HUNT 3). The study focuses on the following questions:

- 1) Is there a cross-sectional association between physical activity and scores on mental health (HADS) among women and men?
- 2) Is there a cross-sectional association between physical activity and scores on the Eysenck Personality Questionnaire (EPQ) among women and men?



## 3.0 Materials and methods

Data were collected from The Health Survey in Nord-Trøndelag (Helseundersøkelsen i Nord-Trøndelag, HUNT), a population-based observational health survey in Norway. For the present cross-sectional study, the occurrence of leisure-time PA, personality, depression, and anxiety were all reported using questionnaires developed for HUNT 3.

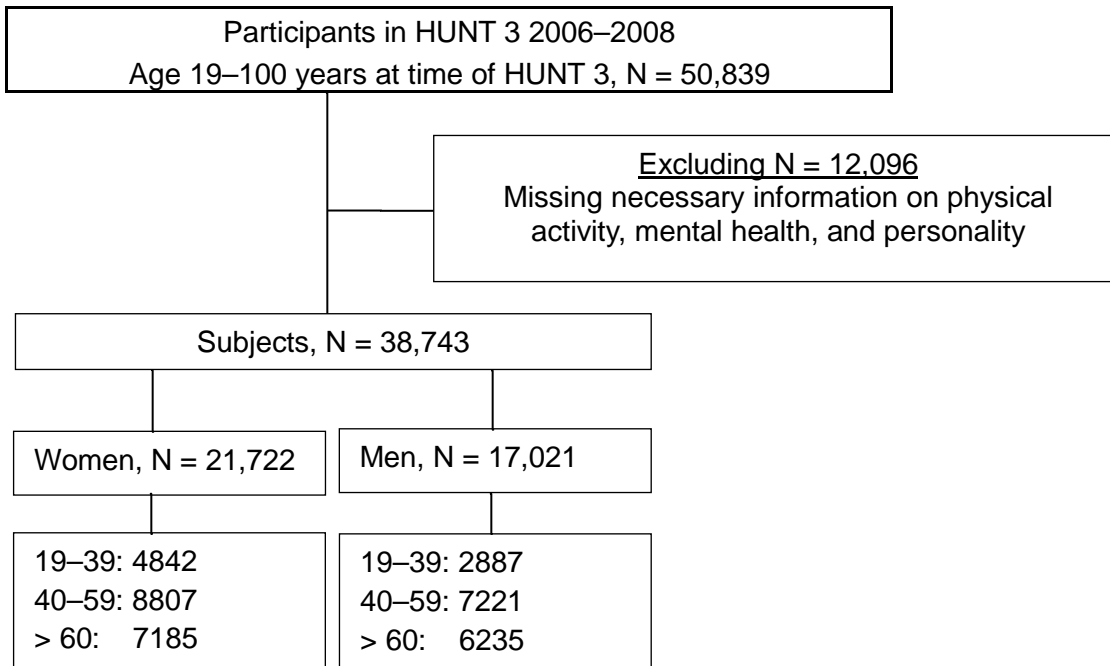
### 3.1 Design

During the period 2006–2008, all adults in the county of Nord-Trøndelag in Norway aged 19 years or older received a posted letter with an invitation to participate in a health survey (HUNT 3). The letter included a comprehensive structured questionnaire designed to assess demographics, health, lifestyle, and personality. From the 94,149 eligible individuals invited to participate in HUNT 3, 50,839 (54.0%) returned the questionnaire. Of those, 27,779 (58.5%) were women and 23,060 (49.3%) men. During the medical examination participants were handed a second, more detailed, questionnaire. Participants either filled in and delivered the questionnaire at the facility or completed it at home and returned it by mail.

### 3.2 Sample

All 50,839 participants in HUNT 3 aged 19 years or older were included in the study. Of those, 12,096 (23.8%) subjects were excluded from the analysis because of missing information relating to PA, HADS, or EPQ (Figure 1). For subjects who reported 0 frequency but had missing answers on duration and intensity, a 0 score on duration and intensity was assigned. The sample then consisted of 38,743 subjects, 21,722 women (56.1%) and 17,021 men (43.9%). The mean age of the sample was 51.2 years for women and 55.1 years for men.

The Regional Committee for Ethics in Medical Research (Norway) approved the HUNT study. All participants gave their informed consent to participate in the study.



**Figure 1.** Flow chart showing the exclusion of participants in the HUNT 3 study of physical activity, mental health, and personality.

## 3.3 Measurements

### 3.3.1 Physical activity

The participants reported their average weekly frequency of leisure-time PA during the last 12 months prior to participation in HUNT 3 by selecting one of five response choices (0, < 1, 1, 2–3, > 4 times). Those who reported exercising once per week or more were also asked about the average duration (four categories: < 15, 15–30, 30–60, > 60 min.) and average intensity of activity (three categories: light, moderate, vigorous). The questions regarding PA from the HUNT survey have been validated with a good internal consistency in men (Kurtze, Rangul, & Hustvedt, 2008).

Among subjects who reported frequency, duration, and intensity, a summary index of PA was calculated using the following method. The frequency scale was recoded to indicate approximate times per week (0, 0.5, 1, 2.5, 5), the duration scale was estimated by approximate hours per session of PA (0, 0.12, 0.38, 0.75, 1.5), and the intensity scale was scored as in the questionnaire (1 for light, 2 for moderate, and 3 for vigorous). Furthermore, the PA index was divided into three equal categories indicating light, moderate and high PA based upon the 33rd and 66th percentiles of the score. This categorization above was performed separately among women and men.

### **3.3.2 Hospital Anxiety and Depression Scale (HADS)**

The HADS, which consists of two subscales (total 14 items), is designed for use in health surveys. The aim is to estimate the occurrence of mental health problems in populations, and therefore symptoms of severe psychopathology are not included. The two subscales consists of seven items for depression (HADS-D) and seven items for anxiety (HADS-A) (Zigmond & Snaith, 1983), but valid HADS subscale scores were calculated for those having completed at least five of seven items. A 4-point Likert scale was used on each question, from 0 (not present) to 3 (maximally present), formulated in a readable language. This was found satisfactory when the questions was translated in Norwegian (Mykletun, Stordal, & Dahl, 2001). The classification of scores on the HADS-D and HADS-A subscales is as follows: 0–7 = normal, 8–10 = mild disorder, 11–14 = moderate disorder, and 15–21 = severe disorder. In the present analysis, a cut-off point of 8 was used on each subscale (Zigmond & Snaith, 1983). Validation studies indicate high sensitivity and specificity of a score > 8 for both HADS-D and HADS-A (Bjelland, Dahl, Haug, & Neckelmann, 2002; Herrmann, 1997).

### **3.3.3 Eysenck Personality Questionnaire (EPQ)**

The EPQ was developed from a factor analysis of the Maudsley Personality Inventory (MPI) by Eysenck & Eysenck (1975), and is widely used for examining personality traits (Buss & Larsen, 2005). The short-form version of the EPQ consists of 12 items for aspects of extroversion-introversion and neuroticism-emotional stability. A modified version, the Eysenck Personality Questionnaire Revised-Abbreviated (EPQR-A), was used

in HUNT 3 with 6 items on the extroversion scale and a further 6 items on the neuroticism scale. The selection of combinations of items in the short-form version was based on analysis of the best predicted score from full-scale data material with a high validity for both extroversion and for neuroticism (Francis, Brown, & Philipchalk, 1992). The items on the scale are dichotomous, with a yes (1)/no (0) response to each item and the traits are sum score calculations ranging from 0 to 6 on each scale. In the present study, a higher score indicates higher distribution of the trait (Eysenck & Eysenck, 1975).

### **3.3.4 Confounding variables**

Confounders were integrated in the main analysis as covariates if their estimated univariate linear relationship with either the HADS subscales or EPQ subscales had a significance level of  $p < 0.20$ . The following variables were identified as potential confounders: age (categorized as 19–40, 41–60, and > 60 years), body mass index (< 18.5, 18.5–24.9, 25–29.9, 30–34.9, > 35 kg/m<sup>2</sup> on the WHO scale (WHO, 2000)), marital status (unmarried, married, widowed, previously married), living with other people (yes, no), occupational activity level (mostly passive, frequently walking, frequently lifting and walking, heavy manual labor), current smoking status (yes, former, no), frequency of alcohol consumption during the 12 months prior to the study (teetotaler, < 1 time per month, 1 times per month, 2–3 times per month, 1 time per week, 2–3 times per week, 4–7 times per week), mental health problems in the family (yes, no, uncertain), and chronic somatic diseases (yes, no), including diabetes, angina pectoris, myocardial infarction, asthma, diabetes, epilepsy, arthritis, osteoporosis, stroke, pulmonary arterial obstructive disease, sarcoidosis, Bechterew's disease, and fibromyalgia. An additional analysis was performed to assess the potential interaction between age or BMI and other confounders.

## **3.5 Statistical analyses**

Statistical analyses were carried out using SPSS Version 11. Descriptive statistical analysis included total number (N) of participants, means, standard deviations (SDs), and percentages of categorical baseline characteristics of the sample in relation to HADS-D or HADS-A scores above 8. The mean HADS-D and HADS-A scores across the subgroups of baseline characteristics were examined using one-way ANOVA

analysis. Adjusted logistic regression was used to study the association between the odds of being either depressed or anxious among each PA category in comparison with a reference category. Parameter estimates were obtained by maximum likelihood and odds ratios (ORs) generated for HADS-defined depression and HADS-defined anxiety with corresponding 95% confidence intervals (CIs).

With personality, the mean score of the distribution of EPQ-extroversion and EPQ-neuroticism according to gender were tested with independent t-tests. Analyses of the association between PA and personality were carried out by performing a general linear model (GLM) analysis was conducted to study the adjusted mean score and linear trend of EPQ-extroversion and EPQ-neuroticism across PA categories and in comparison with a reference category. Parameter estimates were achieved by beta (B) generated for extroversion and neuroticism scores with corresponding 95% CIs.

In all of the above-mentioned analyses, adjusted models were run separately for each of the PA variables (PA index, frequency, duration, and intensity) in relation to HADS and EPQ. Furthermore, all adjusted analyses were either simple (adjusting for age only) or multivariate, where the variables in the multivariate model were selected by the univariate relationship between either HADS or EPQ and possible confounding variables having a  $p < 0.2$  as described previously. In further analyses, probabilities below  $p = 0.05$  were regarded as statistically significant. However, a statistical significance level of  $p = 0.01$  was chosen in the GLM analysis for trend.

# 4.0 Results

## 4.1 Physical activity

As shown in the lower half of Table 1, a total of 7201 (18.5%) individuals in the sample were physically active almost every day on a weekly basis. PA was highly related to age, and of those aged < 60 years, 7033 (30.2%) were assigned a low PA score, 10,308 (44.3%) were assigned a moderate PA score, and 5918 (25.4%) were assigned a high PA score. In comparison, of those aged > 60 years, 4655 (35.5%) were assigned a low PA score, 5019 (38.3%) were assigned a moderate PA score, and 3425 (26.1%) were assigned a high PA score.

## 4.2 HADS-D score with gender

Table 1 lists the numbers and percentages of levels of baseline characteristics, including PA and personality and their mean scores on the depression scale among women and men. A total of 2531 (9.5%) individuals scored > 8 on the HADS-D scale. Mean HADS-D score was 3.15 among women and 3.55 among men. Altogether, 1910 (8.8%) women and 1774 (10.4%) men scored > 8 on the HADS-D scale. When the classification of the HADS-D subscale (Zigmond & Snaith, 1983) was applied, 1454 (6.7%) women and 1359 (8.0%) men had “mild depression”, 361 (1.7%) women and 333 (2.0%) men had “moderate depression”, and 95 (0.4%) women and 82 (0.5%) men had “severe depression”.

**Table 1 Baseline characteristics and scored depression in the HUNT 3 study population.**

Characteristics	Women (N = 21,722)				Men (N = 17,021)			
	HADS-D				HADS-D			
	N	Mean	SD	% (>8)†	N	Mean	SD	% (>8)†
<b>Age</b>				*				*
19-40	4842	2.44	2.58	5.8	2887	2.77	2.68	6.8
41-60	9188	3.01	2.88	8.5	7491	3.43	2.93	9.7
>60	7692	3.73	2.90	11.1	6643	4.02	2.94	12.8
<b>Marital status</b>				*				*
Married/partnership	12586	3.02	2.76	7.8	11058	3.50	2.83	6.2
Unmarried	4258	2.81	2.81	7.6	3739	3.46	3.02	2.5
Divorced/separated	2294	3.48	3.20	12.1	1557	3.82	3.22	13.1
Widowed	2563	3.98	3.00	12.8	591	4.32	3.17	15.7
<b>Occupational activity level</b>				*				*
Sedentary	4589	2.84	2.76	7.5	4787	3.25	2.83	8.9
Frequent walking	5734	2.77	2.71	6.6	3209	3.15	2.73	8.0
Frequent walking and lifting	4511	2.77	2.64	6.3	2744	3.38	2.81	8.4
Heavy manual labor	320	3.62	3.11	11.6	2199	3.68	2.91	10.6
<b>BMI</b>				*				*
<18.5	182	3.85	3.59	17.6	45	5.22	4.41	28.9
18.5-24.9	8149	2.83	2.75	7.2	4107	3.38	2.92	10.0
25-29.9	8260	3.16	2.83	8.5	9016	3.48	2.85	9.6
30-34.9	3635	3.49	2.99	10.7	3168	3.80	3.02	12.1
>35	1421	3.73	3.07	13.0	636	4.15	3.19	14.3
<b>Current smoking status</b>				*				*
Yes	9860	2.93	2.78	10.8	4376	3.82	3.03	12.6
Former	5441	3.12	2.83	8.4	5402	3.66	2.89	10.9
No	6016	3.46	3.46	7.7	7002	3.26	2.84	8.5
<b>Alcohol (past 12 months)</b>				*				*
Teetotaler	1116	3.61	3.15	12.5	430	3.83	3.11	13.0
No recent drinking <sup>a</sup>	9062	3.39	3.00	10.5	4932	3.95	3.13	13.5
2-3 times per month	4524	2.85	2.67	6.9	3901	3.37	2.78	9.2
1 time per week	3975	2.86	2.72	6.9	4342	3.32	2.78	8.5
2-3 times per week	2278	2.89	2.72	7.5	2728	3.35	2.83	8.7
4-7 times per week	392	2.98	2.84	6.9	581	3.71	3.00	11.0
<b>Median EPQ-E score<sup>#</sup></b>				*				*
Lower half	10938	3.80	3.09	12.9	9233	4.18	3.09	14.7
Upper half	10847	2.47	2.46	4.7	7788	2.80	2.51	5.4
<b>Median EPQ-N score<sup>^</sup></b>				*				*
Lower half	10938	2.01	2.06	2.1	11101	2.72	2.37	4.3
Upper half	10784	4.28	3.11	15.6	5920	5.11	3.21	21.8
<b>Chronic somatic diseases</b>				*				*
Yes	8691	3.73	3.07	12.2	6133	4.12	3.07	14.3
No	13031	2.74	2.66	6.5	10888	3.23	2.78	8.2
<b>Mental health problems in the family</b>				*				*
Yes	4788	3.66	3.19	13.1	2741	4.03	3.20	15.2
No	14768	2.84	2.64	6.6	12414	3.32	2.78	8.6
Uncertain	1315	3.98	3.29	14.7	1422	4.38	3.18	15.0

**Table 1** continued

Characteristics	N	Mean	SD	% (>8)†	N	Mean	SD	% (>8)†
<b>Frequency of weekly PA</b>				*				*
< 1 time per week	3647	3.94	3.26	14.4	4315	4.02	3.14	13.9
Once per week	4474	3.27	2.87	9.2	3743	3.54	2.84	9.7
2-3 times per week	9244	2.88	2.68	7.0	6119	3.28	2.79	8.5
Almost every day	4357	2.88	2.78	7.4	2844	3.41	2.89	10.2
<b>Duration of weekly PA</b>				*				*
<15 min.	725	4.58	3.43	18.6	755	4.46	3.23	17.6
15-30 min.	3260	3.47	2.91	10.3	2477	3.89	2.96	12.4
30-60 min.	12331	2.94	2.75	7.6	7880	3.35	2.79	8.7
>60 min.	3269	2.68	2.64	6.3	3618	3.23	2.84	8.8
<b>Intensity of PA</b>				*				*
Take it easy	8805	3.51	2.94	10.6	5626	3.97	3.01	13.1
I push until I lose my breath	10054	2.65	2.62	6.1	8044	3.20	2.74	7.8
I practically exhaust myself	381	2.24	2.63	5.5	679	2.46	2.59	5.2
<b>PA index<sup>+</sup></b>				*				*
Low	6151	3.65	3.05	12.1	5537	3.87	2.98	12.3
Moderate	9160	2.93	2.71	7.2	6167	3.34	2.78	8.4
High	5209	2.64	2.64	6.1	4134	3.15	2.80	8.5

Notes: PA = physical activity; HADS-D = Hospital Anxiety and Depression Scale Depression subscale; BMI = body mass index; EPQ-E = Eysenck Personality Questionnaire subscale extroversion; EPQ-N = Eysenck Personality Questionnaire subscale neuroticism; □ = No drinking in the past 2 weeks, but not a teetotaler; + = Physical activity index: sum score of frequency, duration, and intensity; # = median extroversion score of 4.0; ^ = median neuroticism score of 1.0; † >8 = sum-score of 8 or higher of HADS-D; \* = sig. p-values (< 0.05) indicate results of the Pearson's chi-square test.

### 4.3 HADS-A score with gender

Table 2 lists the numbers and percentages of levels of baseline characteristics, including PA and personality and their mean scores on the anxiety scale among women and men. In comparison with depression, a higher prevalence of anxiety was detected in the sample, with a total of 4089 (14.2%). The mean HADS-A score was 4.37 among women and 3.53 among men. When the classification of the HADS-A subscale (Zigmond & Snaith, 1983) was applied, 3776 (17.4%) women and 1742 (10.2%) men scored > 8 on the HADS-A scale. Among those, 2435 (11.2%) women and 1215 (7.1%) men had “mild anxiety”, 951 (4.4%) women and 384 (2.3%) men had “moderate anxiety”, and 390 (1.8%) women and 143 (0.8%) men had “severe anxiety”.



**Table 2 Baseline characteristics and scored anxiety in the HUNT 3 study population.**

Characteristics	Women (N = 21,722)				Men (N = 17,021)			
	HADS-A				HADS-A			
	N	Mean	Std	% (>8)†	N	Mean	Std	% (>8)†
<b>Age</b>				*				*
19-40	4842	4.56	3.40	18.3	2887	3.92	2.98	11.7
41-60	9188	4.36	3.55	17.6	7491	3.72	3.15	11.9
> 60	7692	4.27	3.40	16.5	6643	3.16	2.78	7.7
<b>Marital status</b>				*				*
Married/partnership	12586	4.22	3.36	15.9	11058	3.34	2.85	8.6
Unmarried	4258	4.63	3.48	19.2	3739	3.96	3.16	13.1
Divorced/separated	2294	4.90	3.87	22.7	1557	4.00	3.48	15.3
Widowed	2563	4.21	3.50	16.9	591	3.27	2.85	8.8
<b>Occupational activity level</b>				*				*
Sedentary	4589	4.17	3.38	15.8	4787	3.58	3.05	10.5
Frequent walking	5734	4.24	3.34	15.8	3209	3.50	2.91	9.7
Frequent walking and lifting	4511	4.39	3.41	17.3	2744	3.58	2.91	10.3
Heavy manual labor	320	4.92	3.65	22.8	2199	3.66	3.04	10.7
<b>BMI</b>				*				*
<18.5	182	5.27	4.13	24.7	45	4.60	3.32	20.0
18.5-24.9	8149	4.42	3.45	17.4	4107	3.60	2.94	10.0
25-29.9	8260	4.32	3.41	16.7	9016	3.49	2.97	10.0
30-34.9	3635	4.34	3.49	18.0	3168	3.51	3.06	10.6
>35	1421	4.36	3.64	18.4	636	3.76	3.33	12.4
<b>Current smoking status</b>				*				*
Yes	6016	4.98	3.74	23	4376	3.87	3.24	13.2
Former	5441	4.32	3.41	16.7	5402	3.46	2.97	9.8
No	9860	4.02	3.26	14.2	7002	3.36	2.84	8.5
<b>Alcohol (past 12 months)</b>				*				*
Teetotaler	1116	4.07	3.57	15.9	430	3.02	3.03	7.0
No recent drinking <sup>□</sup>	9062	4.56	3.57	19.2	4932	3.59	3.15	11.5
2-3 times per month	4524	4.21	3.30	15.5	3901	3.49	2.86	9.1
1 time per week	3975	4.37	3.40	17.0	4342	3.55	2.91	9.8
2-3 times per week	2278	4.21	3.40	15.4	2728	3.55	2.99	10.4
4-7 times per week	392	4.21	3.47	17.6	581	3.55	3.25	11.5
<b>Median EPQ-E score#</b>				*				*
Lower half	10875	4.63	3.59	19.5	9233	3.75	3.14	12.0
Upper half	10847	4.11	3.31	15.2	7788	3.28	2.80	8.1
<b>Median EPQ-N score^</b>				*				*
Lower half	10938	2.49	2.08	2.2	11101	2.37	1.99	1.6
Upper half	10784	6.28	3.55	32.8	5920	5.71	3.55	26.4
<b>Chronic somatic diseases</b>				*				*
Yes	8691	4.75	3.68	20.9	6133	3.75	3.17	12.4
No	13031	4.12	3.29	15.1	10888	3.41	2.89	9.0
<b>Mental health problems in the family</b>				*				*
Yes	4788	5.44	3.94	27.0	2714	4.53	3.58	19.1
No	14768	3.90	3.15	13.1	12414	3.20	2.72	7.3
Uncertain	1315	5.49	3.68	26.8	1422	4.45	3.36	17.2

**Table 2** continued

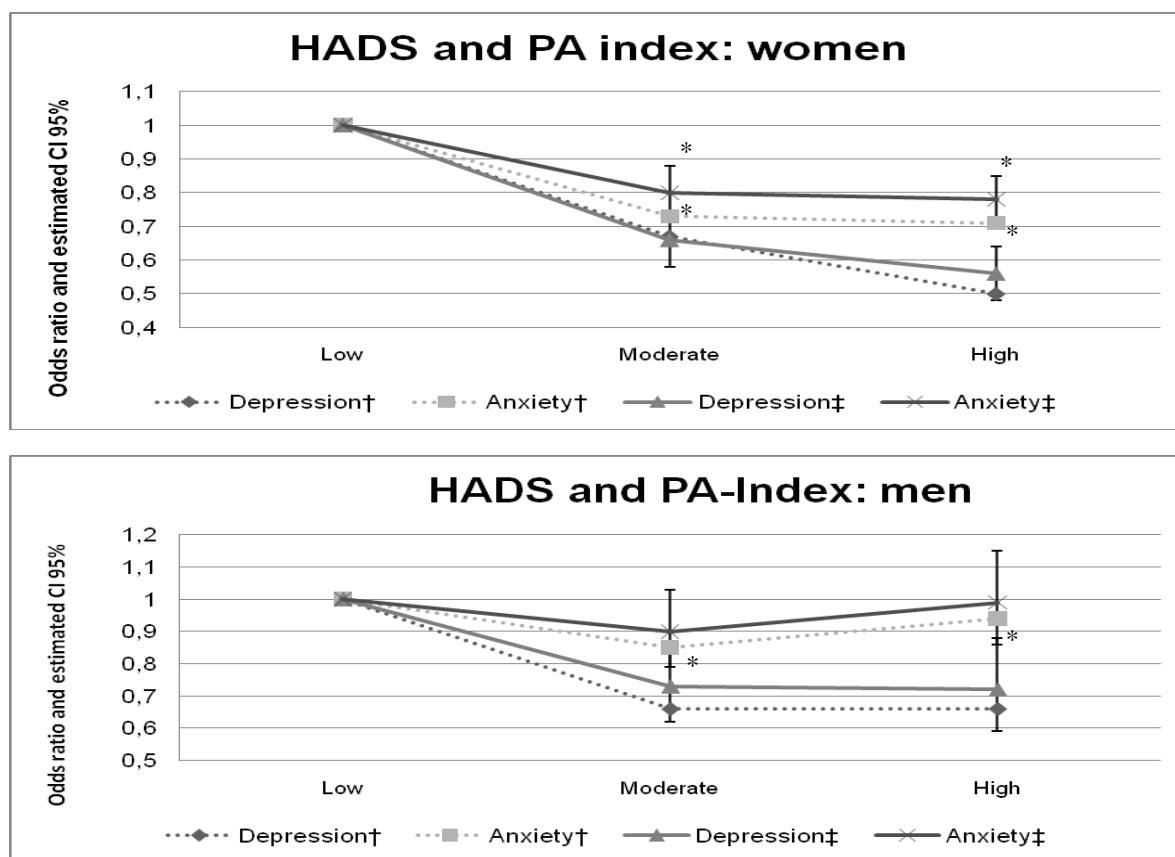
<b>Characteristics</b>	<b>N</b>	<b>Mean</b>	<b>Std</b>	<b>%</b>	<b>N</b>	<b>Mean</b>	<b>Std</b>	<b>% (&gt;8)†</b>
<b>Frequency of weekly PA</b>				*				
<1 time per week	3647	4.77	3.80	21.6	4315	3.64	3.13	11.7
Once per week	4474	4.41	3.46	17.9	3743	3.56	2.92	9.6
2-3 times per week	9244	4.24	3.31	15.9	6119	3.49	2.96	9.8
Almost every day	4357	4.27	3.46	16.4	2844	3.43	2.98	9.9
<b>Duration of weekly PA</b>				*				
<15 min.	725	5.18	3.89	25.8	755	3.76	3.06	11.3
15-30 min.	3260	4.48	3.54	19.2	2477	3.69	3.15	11.5
30-60 min.	12331	4.30	3.39	16.5	7880	3.45	2.89	9.3
>60 min.	3269	4.21	3.36	15.7	3618	3.53	3.00	10.2
<b>Intensity of PA</b>				*				
Take it easy	8805	4.48	3.50	18.6	5626	3.46	2.97	10.2
I push until I lose my breath	10054	4.21	3.35	15.6	8044	3.54	2.95	9.7
I practically exhaust myself	381	4.33	3.36	16.3	679	3.78	3.13	10.3
<b>PA index<sup>‡</sup></b>				*				
Low	6151	4.66	3.64	20.4	5537	3.60	3.05	10.8
Moderate	9160	4.24	3.33	16.0	6167	3.48	2.89	9.4
High	5209	4.19	3.38	15.5	4134	3.48	3.00	10.1

Notes: PA = physical activity; HADS-A = Hospital Anxiety and Depression Scale Anxiety subscale; BMI = body mass index; EPQ-E = Eysenck Personality Questionnaire subscale extroversion; EPQ-N = Eysenck Personality Questionnaire subscale neuroticism; □ = No drinking in the past 2 weeks, but not a teetotaler; + = Physical activity index: sum score of frequency, duration, and intensity; # = median extroversion score of 4.0; ^ = median neuroticism score of 1.0; † >8 = sum-score of 8 or higher of HADS-A; \* = sig. p-values (< 0.05) indicate results of the Pearson's chi-square test.

## 4.4 The association between physical activity, depression, and anxiety

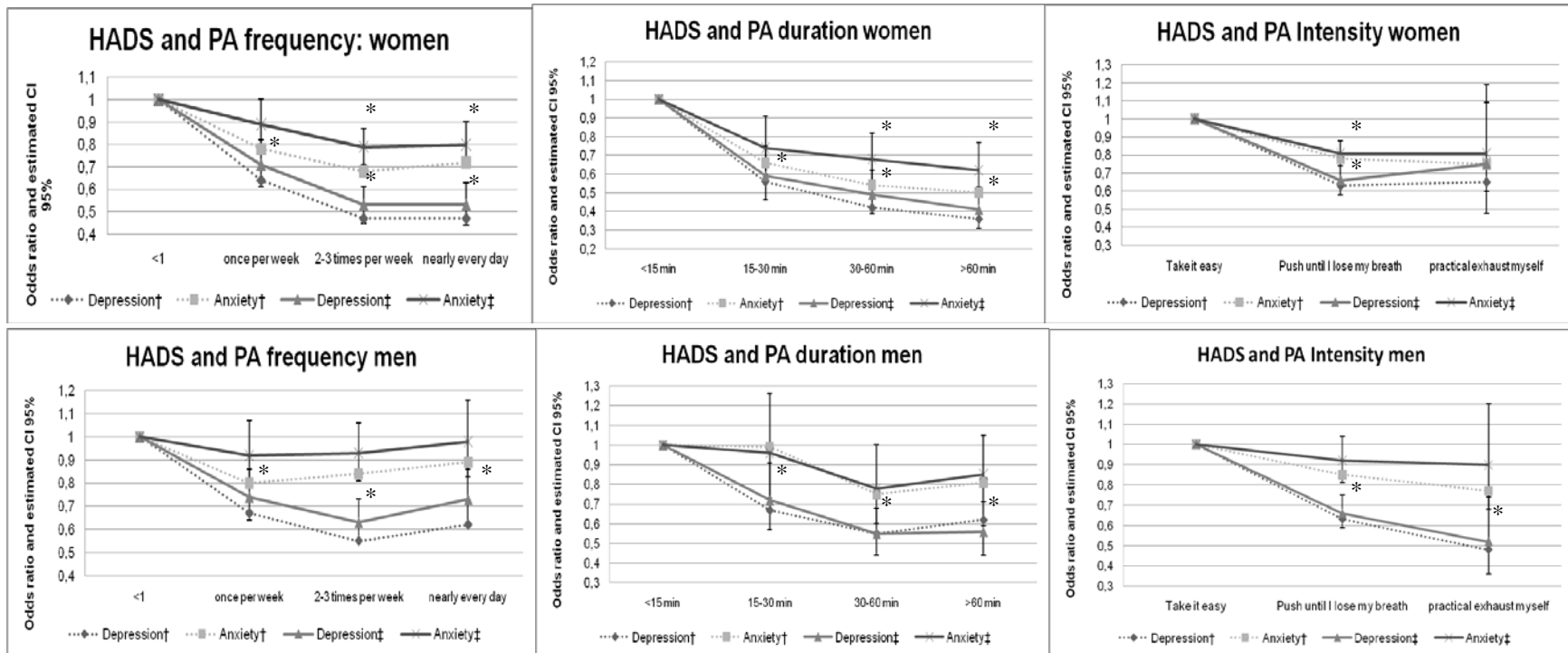
According to the calculated index, moderate and high PA were associated with a significantly lower prevalence of HADS-defined depression and anxiety compared with low levels of PA among both women and men ( $p < 0.05$ ). Symptoms of depression and anxiety showed moderate reduction with increased PA levels among women, while increased PA levels were associated with a moderate reduction in HADS-defined depression and a small reduction in HADS-defined anxiety among men (Figure 2). The associations noted above were consistent among frequency, duration, and intensity (Figure 3). The observed association obtained by logistic regression analysis was found to be somewhat similar among women after adjusting for the suspected confounding effects of age, body mass index, alcohol consumption, current smoking status, mental problems in

the family, and chronic somatic diseases (Figures 2 and 3). An exception was that high intensity reached insignificant levels with HADS-defined depression among women (Figure 3). Occupational activity level had a significant univariate linear relationship with HADS-defined anxiety only ( $p < 0.20$ ) and not with depression. None of the 13 different interactions tested for, between PA variables and the covariates in the models predicting either depression or anxiety had significant p-values. Among men, the association of PA levels with HADS-defined depression was unaltered from the univariate analysis, but both moderate and high PA reached insignificant levels with HADS-defined anxiety in the adjusted analysis ( $p > 0.05$ ) (Figure 2).



**Figure 2 Adjusted odds ratio from the logistic regression analysis of the association between HADS subscales and PA among women and men.**

(PA = physical activity; CI = confidence interval; \* = statistically significant p-value ( $< 0.05$ ) from the logistic regression analysis; † = adjusted for age; ‡ = adjusted for age, BMI, alcohol consumption during last 12 months, current smoking status, chronic somatic diseases, mental health problems in the family, and marital status; PA index = calculated index of sum score of frequency, duration, and intensity).



**Figure 3 Adjusted odds ratio from the logistic regression analysis of the association between HADS subscales and frequency, duration, and intensity of activity among women and men.**

(PA = physical activity; CI = confidence interval; \* = statistically significant p-value (< 0.05) from the logistic regression analysis; † = adjusted for age; ‡ = adjusted for age, BMI, alcohol consumption during last 12 months, current smoking status, mental health problems in the family, chronic somatic diseases, and marital status; PA index = calculated index of sum score from frequency, duration, and intensity).

## 4.5 Physical activity and personality

A t-test analysis revealed that women scored significantly higher than men on EPQ-extroversion ( $p = 0.001$ ) and EPQ-neuroticism ( $p = 0.001$ ) (results not shown). There was a significant ( $p < 0.01$ ) negative trend across lower PA index levels with EPQ-extroversion score and a statistically significant ( $p < 0.01$ ) positive trend across lower PA index levels with EPQ-neuroticism score in comparison with high PA. This linear trend was similar after accounting for the possible confounding effects of age, alcohol consumption, smoking status, chronic somatic diseases, and mental problems in the family (Tables 3 and 4). None of the 8 different interactions tested for reached statistical significance ( $p > 0.20$ ) in the relationship between PA variables and either EPQ-extroversion or EPQ-neuroticism. While lower EPQ-extroversion score had a significant negative trend with lower frequency and intensity of activity among both women and men ( $p < 0.01$ ), lower duration of activity had a significant negative trend with scored EPQ-extroversion ( $p < 0.01$ ) only among women (Table 3). EPQ-neuroticism score had a positive trend among individuals with lower frequency and duration of activity ( $p < 0.01$ ). Although intensity of activity had a significant trend with EPQ-neuroticism score ( $p < 0.01$ ), only light intensity of activity among women was significantly associated with a higher score on EPQ-neuroticism compared with those who practically exhausted themselves ( $p < 0.05$ ) (Table 4).

**Table 3 adjusted beta ( $\beta$ ) from general linear model analysis for extroversion in relation to physical activity in women and men.**

PA	Extroversion					
	Women (N = 21,722)			Men (N =17,021)		
	Adjusted <sup>a</sup>	Adjusted <sup>+</sup>	CI 95%	Adjusted <sup>a</sup>	Adjusted <sup>+</sup>	CI 95%
<b>PA Index+</b>						
Low	-0.20	-0.22	-0.27 to -0.17	-0.07	-0.09	-0.15 to -0.04
Moderate	-0.11	-0.11	-0.16 to -0.07	-0.05	-0.06	-0.11 to -0.01
High	Ref	Ref		Ref	Ref	
P for trend			*			*
R <sup>2</sup>			0.049			0.028
<b>Frequency of weekly PA</b>						
<1	-0.25	-0.28	-0.34 to -0.22	-0.12	-0.14	-0.21 to -0.08
1 time per week	-0.11	-0.14	-0.19 to -0.08	-0.04	-0.06	-0.13 to 0.00
2-3 times per week	-0.06	-0.07	-0.12 to -0.03	-0.00	-0.02	-0.08 to 0.05
Almost every day	Ref	Ref		Ref	Ref	
P for trend			*			*
R <sup>2</sup>			0.051			0.029
<b>Duration of weekly PA</b>						
< 15 min.	-0.11	-0.09	-0.20 to 0.02	-0.02	-0.03	-0.13 to 0.08
15-30 min.	-0.19	-0.18	-0.25 to -0.12	-0.04	-0.04	-0.11 to 0.03
30 min - 1 hr	-0.09	-0.08	-0.13 to -0.03	-0.04	-0.03	-0.08 to 0.02
>1 hr	Ref	Ref		Ref	Ref	
P for trend			*			
R <sup>2</sup>			0.047			0.029
<b>Intensity of PA</b>						
Take it easy	-0.28	-0.29	-0.42 to -0.15	-0.20	-0.22	-0.33 to -0.11
Push until I lose my breath	-0.16	-0.17	-0.30 to -0.03	-0.15	-0.16	-0.26 to -0.05
Practically exhaust myself	Ref	Ref		Ref	Ref	
P for trend			*			*
R <sup>2</sup>			0.070			0.065

Notes: PA = physical activity; CI = confidence interval; R<sup>2</sup> = coefficient of determination; \* = p-value (< 0.01) of the general linear model analysis with PA variables as covariates; a = adjusted for age; b = adjusted for age, alcohol consumption, current smoking status, chronic somatic diseases, and living with others; + = Physical activity index: sum score of frequency, duration, and intensity.

**Table 4 adjusted beta ( $\beta$ ) from general linear model analysis for neuroticism in relation to physical activity in women and men.**

PA	Neuroticism					
	Women (N = 21,722)			Men (N =17,021)		
	Adjusted $\alpha$	Adjusted#	CI 95%	Adjusted $\alpha$	Adjusted#	CI 95%
<b>PA Index+</b>						
Low	0.40	0.30	0.23 to 0.39	0.21	0.17	0.11 to 0.24
Moderate	0.06	0.05	-0.01 to 0.10	-0.00	0.01	-0.05 to 0.07
High	Ref	Ref		Ref	Ref	
P for trend			*			*
R <sup>2</sup>			0.070			0.065
<b>Frequency of weekly PA</b>						
1 time per week	0.14	0.14	0.06 to 0.21	-0.01	0.03	-0.05 to 0.11
2-3 times per week	-0.03	-0.02	-0.09 to 0.04	-0.05	-0.01	-0.08 to 0.06
Almost every day	Ref	Ref		Ref	Ref	
P for trend			*			*
R <sup>2</sup>			0.072			0.066
<b>Duration of weekly PA</b>						
< 15 min	0.80	0.59	0.44 to 0.74	0.52	0.44	0.32 to 0.56
15-30 min	0.31	0.21	0.12 to 0.29	0.30	0.24	0.16 to 0.32
30 min - 1 hr	0.10	0.09	0.02 to 0.15	0.06	0.06	-0.00 to 0.12
> 1 hr	Ref	Ref		Ref	Ref	
P for trend			*			*
R <sup>2</sup>			0.071			0.069
<b>Intensity of PA</b>						
Take it easy	0.33	0.26	0.07 to 0.44	0.21	0.11	-0.02 to 0.23
Push until I lose my breath	0.01	0.01	-0.17 to 0.19	0.02	-0.01	-0.13 to 0.11
Practically exhaust my self	Ref	Ref		Ref	Ref	
P for trend			*			*
R <sup>2</sup>			0.070			0.065

Notes: PA = physical activity; CI = confidence interval; R<sup>2</sup> = coefficient of determination; \* = p-value (< 0.01) of the general linear model analysis with PA run as covariate; a = adjusted for age; b = adjusted for age, alcohol consumption, current smoking status, chronic somatic diseases, and living with others; + = Physical activity index: sum score of frequency, duration, and intensity.

## 5.0 Discussion

The purpose of the study was to examine the cross-sectional association between physical activity (PA), mental health, and personality in a Norwegian health survey. The primary findings are that individuals with higher levels of leisure-time PA had fewer symptoms of depression and anxiety measured by HADS, and scored higher on extroversion and lower on neuroticism in comparison with individuals with less leisure-time PA. Compared to low PA levels, moderate levels were related to lower scores of mental health problems after adjusting for possible confounders. Higher amounts of PA were not related to further reductions in HADS scores. Furthermore, lower risk of HADS-defined anxiety was observed among physically active women compared with physically active men. The Eysenck Personality score was weakly, but consistently, related to levels of PA among both women and men in the multivariate models.

The prevalence of depression (9.5%) score from the present study was somewhat higher compared to that of a previous clinical Norwegian study (7.3%; Kringlen et al., 2001). The present study found a lower prevalence of HADS-defined anxiety (14.2%) compared with a US population (18.1%; Kessler et al., 2005), and this is in accordance with an earlier report which claims that the Norwegian population has a lower occurrence of anxiety in comparison with other westernized populations (Norwegian Institute of Public Health, 2009). The scored HADS was diverse between genders, where women scored lower on HADS-defined depression and higher on HADS-defined anxiety than men. The observation of lower HADS-defined depression among women was unexpected since earlier studies have reported a higher rate of depressive symptoms (Kessler et al., 2005; Kringlen et al., 2001) among women compared with men. However, comparable with the results from the present study, an earlier study found a somewhat similar occurrence of HADS-defined depression in the HUNT 2 population (Augestad et al., 2008). The HADS questionnaire lacks the items which cover the somatic symptoms of depression (Bjelland et al., 2002). Therefore, an underrepresentation of HADS-defined depression among women may be present, because women are reported to have a higher occurrence of somatic symptoms with depression than men (Silverstein, 1999). Despite the shortcoming, HADS is a valid screening tool to cover the core aspects of depression according to the ICD-10 classification (Stordahl et al., 2001). In the relationship



between scored personality and gender, a higher mean extroversion and neuroticism score were observed among women than men. The result with scored extroversion diverged with the findings from a previous review investigating the interaction of scored EPQ with gender, where men scored higher in 30 of 37 included studies in comparison with women (Lynn & Martin, 1997).

Approximately 18% of the participants of this study were physically active for 30 minutes or more almost every day. Although women had higher frequency of PA than men, physically active men were found to have slightly higher duration and intensity of activity. This finding is consistent with that of a previous study (Norwegian Directorate of Health, 2009). Regular PA is well recognized as a health-related behavior that is important for both physical health (Haskell et al., 2007) and mental health (Biddle & Mutrie, 2008; Ströhle, 2009).

Observational studies with wide age range have investigated the association between PA and symptoms of both depression and anxiety in the general population (Asztalos et al., 2010; De Moor et al., 2006; De Moor et al., 2008; Goodwin, 2003; Harvey et al., 2010; Mutrie, 2007; Stephens, 1988; Thorsen, et al., 2005). The findings of the present study were comparable to those of a cross-sectional study by Stephens (1988), where lower symptoms of both depression and anxiety were associated with moderate and high PA, compared with low PA in the adjusted analysis.

Teychenne, Ball & Simon (2008) claimed in their meta-analysis that too few systematic observational studies have recommended a general amount of leisure time PA in prevention of depression in the general population (Teychenne, Ball, & Salmon, 2008). This also applies to anxiety (Biddle & Mutrie, 2008). The present study indicates that PA does have mental benefits, but a dose-response relationship was not observed between HADS-defined depression and anxiety with levels of PA. Only minor changes in risk of depression were found with higher amounts of activity in comparison with moderate PA. Hence, the results from present study support the conclusion by Hassmén et al. (2000) that daily vigorous PA may not be more favorable for mental health than moderate PA because it might be associated with athletic performance or hectic schedule with everyday job and family. Thereby, daily vigorous exercise might lead to burnout, which in turn would mimic symptoms of mental health problems. It follows that specific recommendations of PA levels for mental health seem to be more complex in comparison with the recommendation of PA levels for physical health (Ströhle, 2009).

The context in which activity is performed may affect any associations with the mental health. Subjects reporting “heavy manual labor” had higher reported symptoms of depression and anxiety in comparison with lower levels of occupational activity, which is contrast with the observed association between leisure time PA and mental health problems. Previous studies have found leisure-time PA more beneficial than work-related PA for reducing the risk of scored depression (Mutrie & Hannah, 2007; Harvey et al., 2010; Mikkelsen et al., 2010) and anxiety (Harvey et al., 2010), even in cases where the context provided similar frequency, duration, and intensity. Leisure-time activities could support a more meaningful life for individuals through preventing negative behavior (i.e., coping with stress) and promoting positive behavior (i.e., life satisfaction) (Iwasaki, 2008).

Mental health benefits of PA, defined as lower scores of depression and anxiety, did not apply equally between genders. To my knowledge, the present study is the first observational study using HADS as assessment tool that has found a gender effect between PA levels and symptoms of anxiety (Harvey et al., 2010; Thorsen et al., 2005; Mutrie, 2007), where physically active women were observed to have a lower risk of HADS-defined anxiety than physically active men. The dose of PA, were characterized differently with symptoms of depression among women and men, seems to be an important factor in the association with mental health problems between women and men. Higher frequency and duration of activity were associated with lower risk of depression and anxiety among women than men. However, the importance of intensity of activity between women and men with lower symptoms of mental health problems is in relation with the results from a previous cross sectional study (Asztalos et al, 2010), where moderate levels of intensity seems to be most important among women, while high levels of intensity seems to be most important among men. This association with intensity is in relation with the results from a previous cross sectional study (Asztalos et al., 2010). This association with gender is independent of the effects of differences in amount of PA, prevalence of HADS-defined depression and anxiety, or scored personality. A possible explanation, namely that women experience greater mental health benefits from performing health-related activities (i.e., PA) in comparison with men, has been claimed by Stephens (1986). Potential biological, somatic, psychological, and social mechanisms could elucidate this gender effect of levels of PA on the mental health (Asztalos et al., 2010; Chipperfield, Newall, Chuchmach, Swift, & Haynes, 2008; Haug, Mykletun, & Dahl, 2004; Seeman, 1997).

A third underlying variable might possibly be related with both PA and mental health and could perhaps clarify the observed relationship between levels of PA and HADS-defined depression and anxiety. Many confounding variables with scored mental health problems were identified and adjusted for in the analyses, and thus should not confound the observed association between PA and mental health in this study. Personality is suggested to be one of many demographic, sociological, and psychological determinants affecting the perception of benefits of and barriers to health-related behaviors in relation to the alleged risk of disease (Janz & Becker, 1984). The present study observed that scored more extroverted and less neurotic were associated with higher levels of PA, which supports previous studies that investigated the association between scored personality with levels of PA (De Moor et al., 2006; Rhodes & Smith, 2006).

Although this study can not state the relationship between personality and mental health problems, other previous performed studies have clearly found an association between scored low extroversion and high neuroticism with higher risk of depression and anxiety (Klein et al., 2011; Middeldorp et al., 2005; Tambs, 2009). Extroverted individuals are claimed to have less arousal than introverted individuals (Eysenck & Eysenck, 1975), and could consult PA because of challenging activities and possibility to socialize with others (Rhodes & Smith, 2006). Neurotic individuals, on the other hand, are claimed to be emotionally unstable to life events because they perceive them as threatening than individuals who scores low on neuroticism (Eysenck & Eysenck, 1975). Therefore, high scored neurotic individuals, in relation with the health behavior model, might withdraw from participating in PA or perform low levels of PA because they might perceive fewer barriers in relation with their level of arousal than high level PA (Rhodes & Smith, 2006).

Although personality is assumed to be more closely associated with levels of PA compared with environmental factors (Duncan, Spence, & Mummery, 2005), the observed modest effect of personality characteristics with levels of PA in the present study questions the importance of personality in this association. An explanation might be that personality is a biological construct that might set the stage for health behaviors such as PA, either directly or indirectly by affecting other mechanisms such as social cognition, mental health disorders, and somatic diseases (Pettit et al., 2007). Alternatively, extroversion and neuroticism are independent traits on a continuum (Eysenck & Eysenck, 1975), and therefore it is possible to score low or high of both traits (i.e., high scored extroversion and high neuroticism) which might present

diverse behavioral outcomes. Lastly, both positive and negative behavioral health outcomes might be caused of the same trait. For example, extroverted individuals are associated with health-related behaviors like PA (Rhodes & Smith, 2006), but also suggested to be associated with risky behaviors like smoking, high alcohol consumption and risky sexual behavior (Vollrath & Thorgersen, 2002).

## **5.1 Strengths and limitations of the study**

The main strength of the present study is its population-based observational nature. This made it convenient for estimating the occurrence of PA participation, prevalence of mental health problems, and personality traits in the sample population. The wide age range made it possible to extend the result to young adulthood and elderly in the general population. Also, the large sample size made it possible to run a regression analysis controlling for possible confounding effects with a wide range of detailed self-reported variables.

The main limitation of the study is the cross-sectional design, which is only useful for the purpose of descriptive analysis (i.e., prevalence) of associations between factors. Therefore, no firm conclusion can be made regarding the causal structure of the variables which influence the relationship between PA, mental health and personality. Research with experimental design has found a causal association between increased PA and reduced mental health problems (Byrne & Byrne, 1993; McDonald & Hodgdon, 1991), it would be difficult to reach a firm conclusion that PA has the same effect of reducing the symptoms of mental health problems in all individuals in a naturalistic setting since there are several biasing factors, such as social surroundings, positive feedback by health professionals, and the expected therapeutic effect of a given program (Barbour, Edenfield, & Blumenthal, 2007). Longitudinal research is therefore needed. Two possible scenarios might arise with the function of personality in the relationship between PA and mental health: PA might be attractive to certain types of personality and over time prevent symptoms of mental health

problems developing; alternatively, personality might influence the development of mental health problems after a time, leading to a sedentary lifestyle.

This study is based upon self-reported data with satisfactory validity of the PA questionnaire (Kurtze et al., 2008), HADS (Bjelland et al., 2002) and EPQ (Francis et al., 1992). Since self-reported information of the variables above was assessed in this study in favor of direct objective measurements, misclassification or lack of reported information might have occurred and led to incorrect categorization of the included subjects in several ways; First, although the PA questionnaire from present study was more comprehensive than used in previous studies (De Moor et al., 2006; Hassmên et al., 2000), some subjects might exceed the amount of PA in relation with the choices of categories from the PA variables. Also, the PA index had low thresholds of the calculated PA categories in contrast to a previous study (Augestad et al., 2008) because of the aim of equal quantity of subjects between categories of the PA index among women and men. Secondly, the HADS questionnaire is claimed to be a satisfactory screening tool in identifying symptoms of sub-clinical mental health problems (Herrmann, 1997), but do not measure symptoms of severe psychopathology or have questions regarding the whole symptomatic description of depression and anxiety (Bjelland, 2004). This could affect the identification of subjects with depression and anxiety. Lastly, The EPQ is one of the most used trait questionnaires in exercise research now a day (Buss & Larsen, 2005). However, it is questioned if this gender difference of EPQ is a result of the personality or measuring the social manifestation between men and women (Forrest, Lewis, Shevlin, 1999). Nevertheless, self-reported questionnaires are low cost and less time consuming in measuring a phenomenon in large populations in comparison with objective measurements (Rotman, 2002).

A third limitation might be the HUNT 3 population. The HUNT 2 population was claimed to be stable, homogenous, and representative of the Norwegian population as a whole (Holmen et al., 2003), but no comprehensive studies of the HUNT 3 population have been carried out. The rural area of the HUNT 3 population might significantly differ in the frequency of PA participation (Norwegian Directorate of Health, 2004) and prevalence of mental health problems (Norwegian Institute of Public Health, 2009) in comparison with urban areas. Further, there may be variation in levels of PA on a weekly basis according to the season. Even though winters in Norway are colder in comparison with other countries, consistent levels of PA are observed throughout the season due to the popularity of winter sports and

leisure-time activities (Holmen et al., 2003). Also, a lower participation rate in HUNT 3 compared with HUNT 2. The present study found that the participation rate in the study was lowest among women and men in the youngest age group, which was also evident in the HUNT 2 study (Holmen et al., 2003). Approximately 20% of the sample did not respond to the PA, HADS, or EPQ questionnaires. A possible explanation might be that many individuals have only responded to the first questionnaire and did not respond on the follow-up questionnaire which included the questions of mental health problems and personality. Alternatively, high numbers of elderly participants above aged 60 years (37.0%) were participating, and Bjelland (2004) suggested that the reduced cognitive capacity among elderly individuals could explain significant amounts of missing information from the HUNT 2 study. The consequences of low participation rate and missing information may have led to an incorrect distribution of PA, mental health problems, and scored personality among gender and age.

Lastly, residual confounding by incorrectly measured variables or confounding variables not included in the adjusted analysis might have affected the observed associations in both directions. For example, education is associated with poorer health status and lower PA participation (Krokstad & Westin, 2002). Education was not included in the multivariate models because the HUNT 3 study linked the variable to the Central Bureau of Statistics (SSB) rather than data collected in the survey.

## **5.2 Further research and practical implications**

Mental health problems have serious consequences for the life situation of individuals and for society as a whole. Since regular PA is relatively inexpensive and has beneficial effects on physical and mental health with few side effects in comparison with medication, health practitioners should encourage and make arrangements for people to be regularly physically active and thus prevent inactivity. Although personality is weakly related to PA, the importance for initiatives and prescribing PA for public health purposes is still central.

Further research with longitudinal design is important in detecting causal relationships in a general population in stating the relationship between PA, mental health, and personality. Longitudinal and experimental studies are also need to center on the symptomatic development of mental health problems in comparison with mental diseases, due to the consequences for individuals and society as a whole, and they should identify the risk and protective factors in the development of mental health problems. There is no doubt in that extroversion and neuroticism affects this development through different behavioral responses to environmental stimuli, and further research needs to clarify sub-components of these main personality traits or identifying other personality traits (i.e., conscientiousness) that predicts the mechanisms of participation in PA and the etiology of depression and anxiety. Also, extroversion and neuroticism could also be split into those who score high-high, high-low, low-high and low-low on the personality questionnaire. Furthermore, detailed and objective information on PA, depression, anxiety, and personality are important in verifying these underlying mechanisms. Measuring other PA (i.e., types of activity and physical fitness) and social-psychological variables (i.e., self-esteem and social environment) could be more informative in this association.

Research needs also to focus on gender differences between various age groups and the causal relationship between PA and mental health problems and personality. Women and men are biologically and behaviorally diverse, and might therefore perceive, report, or respond to environmental stimulation differently during their lifespan.

## **6.0 Conclusion**

In my study, participants who were regularly voluntarily physically active were less likely to have symptoms of depression and anxiety. Physically active women had a lower risk of anxiety compared with physically active men. Personality is an underlying factor in the associations with levels of PA, but other possible variables may be more elucidating. The function of personality in the relationship with physical activity and mental health problems needs to be further examined.

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## HUNT 3 Questionnaire 1

### Health and daily life

1. How is your health at the moment?

Poor  Not so good  Good  Very good

2. Do you suffer from long-term (at least 1 year) illness or injury of a physical or psychological nature that impairs your functioning in your daily life?

Yes  No

If Yes,

Would you describe your impairment as slight, moderate or severe?

	Slight	Moderate	Severe
Motor ability impairment	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Vision impairment	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Hearing impairment	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Impairment due to physical illness	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Impairment due to mental health problems	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

3. Do you have physical pain now that has lasted more than 6 months?

Yes  No

4. How strong has your physical pain been during the last 4 weeks?

No pain	Very mild	Mild	Moderate	Strong	Very strong
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

5. To what extent has your physical health or emotional problems limited you in your usual socializing with family or friends during the last 4 weeks?

Not at all	Very little	Somewhat	Much	Was not able to socialize
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

### Health services

6. During the last 12 months, have you visited any of the following:

	Yes	No
General practitioner	<input type="checkbox"/>	<input type="checkbox"/>
Another specialist outside the hospital	<input type="checkbox"/>	<input type="checkbox"/>
Consultation w/ a doctor without being admitted to the psychiatric out-patient dept.	<input type="checkbox"/>	<input type="checkbox"/>
to another hospital out-patient dept.	<input type="checkbox"/>	<input type="checkbox"/>
Chiropractor	<input type="checkbox"/>	<input type="checkbox"/>
Homeopath, acupuncturist, reflexologist, laying on of hands or other alternative treatment practitioner	<input type="checkbox"/>	<input type="checkbox"/>

7. Have you been admitted to hospital in the last 12 months?  Yes  No

## Illness and Injury

8. Have you had any kind of attack of wheezing or breathlessness during the last 12 months?  Yes  No

9. Have you at any time during the last 5 years taken medicine for asthma, chronic bronchitis, emphysema or COPD?  Yes  No

10. Do you take or have you taken medication for high blood pressure?  Yes  No

11. Have you had or do you have any of the following: (Put an X on each line)

	Yes	No	If Yes, how old were you the first time
Myocardial infarction (heart attack)	<input type="checkbox"/>	<input type="checkbox"/>	Ex: (34 years old) <input type="text"/> years old
Angina pectoris (chest pain)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="text"/> years old
Heart failure	<input type="checkbox"/>	<input type="checkbox"/>	<input type="text"/> years old
Other heart disease	<input type="checkbox"/>	<input type="checkbox"/>	<input type="text"/> years old
Stroke/brain haemorrhage	<input type="checkbox"/>	<input type="checkbox"/>	<input type="text"/> years old
Kidney disease	<input type="checkbox"/>	<input type="checkbox"/>	<input type="text"/> years old
Asthma	<input type="checkbox"/>	<input type="checkbox"/>	<input type="text"/> years old
Chronic bronchitis, emphysema or COPD	<input type="checkbox"/>	<input type="checkbox"/>	<input type="text"/> years old
Diabetes	<input type="checkbox"/>	<input type="checkbox"/>	<input type="text"/> years old
Psoriasis	<input type="checkbox"/>	<input type="checkbox"/>	<input type="text"/> years old
Eczema on hands	<input type="checkbox"/>	<input type="checkbox"/>	<input type="text"/> years old
Cancer	<input type="checkbox"/>	<input type="checkbox"/>	<input type="text"/> years old
Epilepsy	<input type="checkbox"/>	<input type="checkbox"/>	<input type="text"/> years old
Arthritis (rheumatoid arthritis)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="text"/> years old
Bechterew's disease	<input type="checkbox"/>	<input type="checkbox"/>	<input type="text"/> years old
Sarcoidosis	<input type="checkbox"/>	<input type="checkbox"/>	<input type="text"/> years old
Osteoporosis	<input type="checkbox"/>	<input type="checkbox"/>	<input type="text"/> years old
Fibromyalgia	<input type="checkbox"/>	<input type="checkbox"/>	<input type="text"/> years old
Degenerative joint disease (osteoarthritis)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="text"/> years old
Mental health problems you sought help for	<input type="checkbox"/>	<input type="checkbox"/>	<input type="text"/> years old

12. Has it ever been verified that you had high blood sugar (hyperglycaemia)?  Yes  No

If Yes, in what situation was this discovered the first time?

At a health examination	<input type="checkbox"/>	While sick	<input type="checkbox"/>
While pregnant	<input type="checkbox"/>	Other	<input type="checkbox"/>

## Injuries

13. Have you ever had:

	Yes	No	If Yes, how old were you the first time Ex: (34 years old)
Hip fracture	<input type="checkbox"/>	<input type="checkbox"/>	<input type="text"/> years old
Fractured wrist/forearm	<input type="checkbox"/>	<input type="checkbox"/>	<input type="text"/> years old
Fracture/compressed dorsal vertebrae?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="text"/> years old
Whiplash	<input type="checkbox"/>	<input type="checkbox"/>	<input type="text"/> years old

## Illness in immediate family

14. Do your parents, siblings or children have, or have they had, the following illnesses? (one X per line)

	Yes	No	Don't know
Stroke or brain haemorrhage before the age of 60	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Myocardial infarction (heart attack) before the age of 60	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Asthma	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Allergies/hay-fever/nasal allergies	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Chronic bronchitis, emphysema or COPD	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Cancer	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Mental health problems	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Osteoporosis	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Kidney disease (not kidney stone, urinary tract infection, urinary incontinence)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Diabetes	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

15. Have your parents' siblings, your cousins or either of your grandparents been diagnosed with diabetes (type 1 or type 2)?

Yes  No

## How do you feel?

16. In the last two weeks, have you felt: (one X per line)

	No	A little	A good amount	Very much
Confident and calm	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Happy and optimistic	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Nervous and restless	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Troubled by anxiety	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Irritable	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Down/depressed	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Lonely	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

17. Has anyone at any time in your life tried to oppress, degrade or humiliate you over an extended period of time?

Yes  No

## Lifestyle

T

## Smoking

18. Did any of the adults where you grew up smoke indoors? Yes  No

19. Did your mother smoke when you were growing up? Yes  No

20. Do you smoke? (Put an X in only one box)

No, I have never smoked

If you never smoked, skip to question 22

No, I quit smoking

Yes, cigarettes occasionally (parties/vacation, not daily)

Yes, cigars/cigarillos/pipe occasionally

Yes, cigarettes daily

Yes, cigars/cigarillos/pipe daily

21A. Answer this if you smoke daily now or previously smoked daily:

1. How many cigarettes do/did you usually smoke daily?  Cigarettes pr day

2. How old were you when you started smoking daily?  years old

3. If you previously smoked daily, how old were you when you quit smoking?  years old

21B. Answer this if you smoke/previously smoked occasionally, but not daily:

1. How many cigarettes do/did you usually smoke in a month?  Cigarettes pr mo.

2. How old were you when you started smoking occasionally?  years old

3. If you previously smoked occasionally, how old were you when you quit?  years old

22. Do you use, or have you used snuff?

No, never  Yes, occasionally

Yes, but I quit  Yes, daily

If you answered No, never, skip to question 23

If Yes,

How old were you when you began using snuff?

years old

How many portions snuff do/did you use a month?

Portions snuff a month

If you use(d)/smoke(d) both cigarettes and snuff, which did you begin with first?

Snuff  About the same time (within 3 months)

Cigarettes  Don't remember

7

**Did you begin using snuff to try to quit or cut down on smoking?**

No   
 Yes, to quit smoking  Yes, to cut down on smoking

**Diet**

**23. How often do you normally eat these foods?**  
 (one X on each line)

	0-3 times a month	1-3 times a week	4-6 times a week	Once a day	Twice or more a day
Fruits, berries	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Vegetables	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Chocolate/candy	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Boiled potatoes	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Pasta/rice	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Sausages/hamburgers	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
High-fat fish on bread or for dinner (salmon, trout, herring, mackerel, haddock)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

**24. Do you take the following dietary supplements?**  
 (One X for each supplement)

	Yes, daily	Occasionally	No
Cod-liver oil	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Omega-3 capsules	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Vitamins and/or minerals	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

**25. How many glasses do you usually drink of the following?** ½ litre = 3 glasses (one X on each line)

	Seldom/never	1-6 gl. a week	1 gl. a day	2-3 gl. a day	4 gl or more a day
Water, Farris, etc.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Whole milk (sweet/sour)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Other milk (sweet/sour)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Soda/juice w/sugar	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Soda/juice w/out sugar	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Juice or nectar	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

**26. How many cups of coffee do you drink a day?**  
 (write 0 if you do not drink coffee/tea daily)

	Boiled coffee	Other coffee	Tea
Number of cups	<input type="text"/>	<input type="text"/>	<input type="text"/>

**27. How many cups of coffee do you drink in the evening (after 6pm)?**

Number of cups

**Alcohol**

**28. About how often in the last 12 months did you drink alcohol?** (do not include low-alcohol beer)

4-7 times a week  About once a month   
 2-3 times a week  A few times a year   
 About once a week  Not at all the last year   
 2-3 times a month  Never drink alcohol

**29. Did you drink alcohol during the last 4 weeks?**

Yes  No

If Yes,

**Did you drink so much that you felt very intoxicated (drunk)?**

No  Yes, 1-2 times  Yes, 3 times or more

**30. How many glasses of beer, wine or spirits do you usually drink in the course of two weeks:** (do not include low-alcohol beer, write 0 if you do not drink alcohol)

	Beer	Wine	Spirits
Number of glasses	<input type="text"/>	<input type="text"/>	<input type="text"/>

**31. How often do you drink 5 glasses or more of beer, wine or spirits in one sitting?**

Never  Monthly  Weekly  Daily

**Exercise**

By exercise we mean going for walks, skiing, swimming and working out/sports.

**32. How often do you exercise?** (on the average)

Never   
 Less than once a week   
 Once a week   
 2-3 times a week   
 Nearly every day

**33. If you exercise as often as once or several times a week: How hard do you exercise?** (average)

I take it easy, I don't get out of breath or break a sweat   
 I push myself until I'm out of breath and break into a sweat   
 I practically exhaust myself

**34. For how long do you exercise each time?**(average)

Less than 15 minutes  30 min.-1 hour   
 15-29 minutes  More than 1 hour

**35. Do you have at least 30 minutes of physical activity daily at work or in your leisure time?**

Yes  No

**36. About how many hours do you sit during a normal day?** (include work hours and leisure time)

hours

### Employment

37. If you have had paid or unpaid employment, how would you describe your job? (One X only)

Work that mostly involves sitting (ex: desk work, assembly worker)

Work that requires much walking (ex: clerk, light industry worker, teacher)

Work that requires much walking and lifting (ex: mail carrier, nurse, construction worker)

Heavy physical labour (ex: forester, farmer, heavy construction worker)

### Height/Weight

38. About how tall were you at age 18?

cm Don't remember

39. About how much did you weigh at age 18?

kg Don't remember

40. Are you satisfied with your weight now?

Yes  No, don't weigh enough  No, weigh too much

41. Have you tried to diet in the last 10 years?

No  Yes, a few times  Yes, many times

42. Do you weigh at least 2 kg less than you did 1 year ago?

Yes  No

If Yes, what is the reason for this?

Dieting  Illness/stress  Don't know

### Serious events in the last 12 months

43. Has a member of your immediate family died?

(Child, spouse/partner, sibling or parent)

Yes  No

44. Have you been in imminent mortal danger because of a serious accident, catastrophe, violent situation or war?

Yes  No

45. Has your relationship with your spouse or long-term partner ended?

Yes  No

46. If you answered Yes to one or more of the above questions (43, 44 or 45), how much have you reacted to this in the last 7 days?

Not at all  Moderate amount

A little  Very much

### Childhood – When you were 0-18 years old

47. Who did you grow up with?

Mother  Other relatives

Father  Adoptive parents

Stepmother/stepfather  Foster parents

48. Did your parents leave each other, or get a divorce, when you were a child?

No

Yes, before I was 7 years old  Yes, when I was 7-18 years old

49. Did either of your parents die when you were a child?

No

Yes, before I was 7 years old  Yes, when I was 7-18 years old

50. Did you grow up with pets?

No

Yes, cat  Yes, dog  Yes, horse  Yes, other animal

51. How much milk or yoghurt did you usually drink?

Seldom/never  1-6 glasses pr. week  1 glass pr. day  2-3 glasses pr. day  More than 3 glasses pr. day

52. Did you grow up on a farm with farm animals?

Yes  No

53. When you think about your childhood, would you describe it as:

Very good  Average  Very difficult

Good  Difficult

### In General

54. Thinking about your life at the moment, would you say that you by and large are satisfied with life, or are you mostly dissatisfied? (One X only)

Very satisfied

Satisfied

Somewhat satisfied

A bit of both

Somewhat dissatisfied

Dissatisfied

Very dissatisfied

**Dear HUNT participant**

Thank you for taking part in this health study. We ask that you complete this questionnaire. Though some of the questions are similar to questions you have previously answered, it is important that you answer all the questions. The information will be used in research and preventative health care. Researchers will only have access to anonymous information; this means that the information cannot be traced back to the individual participants.

Please complete the questionnaire and send it in as soon as possible. Postage is paid.

Date completed

20

Vigorous physical activity  
sweat, out of breath

**Housing and Friends**

Who do you live with? (One or more Xs)

No one	<input type="checkbox"/>		
Parents		<input type="checkbox"/>	
Spouse/partner		<input type="checkbox"/>	
Other people over 18 years old		<input type="checkbox"/>	<input type="checkbox"/>
Other people under 18 years old	<input type="checkbox"/>	Number of people under 18	<input type="checkbox"/>

How many hours in total are you in front of a computer screen? (Write 0 if you don't use a computer)

Work  hours      Leisure  hours

How many hours do you watch TV/video/DVD daily?

Less than 1 hour       4-6 hours   
 1-3 hours       More than 6 hours

**Culture/Life Philosophy**

How often in the last 6 months have you been to: (One X per line)

	More than 3 x /mo.	1-3 x /mo.	1-6 x /6 mos.	Never
Museum/art exhibition	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Concert, theatre, film	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Church/chapel	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Sports event	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Are there any pets in your home?

Yes, cat       Yes, dog       No   
 Yes, other animals w/ fur/birds

Do you have friends that can help you when you need them?      Yes       No

Do you have friends that you can speak to confidentially?      Yes       No

**Your Surroundings (neighbourhood/group of farms)**

I feel a strong sense of community with the people who live here (One X)

Strongly agree       Somewhat agree       Not sure       Somewhat disagree       Strongly disagree

We do not trust each other here (One X)

Strongly agree       Somewhat agree       Not sure       Somewhat disagree       Strongly disagree

People like living here (One X)

Strongly agree       Somewhat agree       Not sure       Somewhat disagree       Strongly disagree

How many times in the last 6 months have you participated in the following: (One X per line)

	More than 1x /week	1x /week	1-3x /mo.	1-5x /6 mos.	Never
Association or club meeting/activity	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Music, singing, theatre	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Parish work	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Outdoor activities	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Dance	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Worked out, sports	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

**Physical Activity**

How much of your leisure time have you been physically active in the last year? Weekly average for the year. Commute counts as leisure time.

	None	Less than 1	1-2	3
Low physical activity no sweat, not out of breath	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Which life philosophy is most like yours? (One X only)

Christian       Atheistic   
 Humanistic       Other

When something bad happens in my life, I think that it happened for a purpose.

No       Yes       Don't know

I seek God's help when I need strength and solace.

Never       Sometimes       Often



**Personality**

Describe yourself as you normally are:

- Are you a life of the party type person? Yes No
Are you mostly quiet and reserved when you are around other people? Yes No
Do you like meeting new people? Yes No
Do you like to have a lot of life and excitement around you? Yes No
Are you a relatively lively person? Yes No
Do you usually take the first step to make new friends? Yes No
Are you often worried? Yes No
Are your feelings easily hurt? Yes No
Do you often feel that you lose interest? Yes No
Do you have nervous problems? Yes No
Do you often feel tired and indifferent/unmotivated without reason? Yes No
Do you worry that terrible things might happen? Yes No

**Headaches**

Have you had headaches in the last year? Yes No

If No, skip to Respiratory Tract

If Yes, what type of headache?

- Migraine Other headache

Average number of days a month with headaches:

- Less than 1 day 1-6 days 7-14 days More than 14 days

What is the average strength of your headaches?

- Mild (does not affect activity)
Moderate (affects activity)
Strong (hinders activity)

How long does the headache usually last?

- Less than 4 hours 1-3 days
4 hours - 1 day More than 3 days

Are the headaches usually characterized by or accompanied by:

- (One X per line) Yes No
Throbbing/thumping pain
Pressing pain

- Pain on one side of the head (right or left)
Worsening with physical activity
Nausea and/or vomiting
Hypersensitivity to light and/or noise

Before or during the headache, have you had temporary: (One X per line)

- Visual disturbances (zigzag lines, flickering/flashing light, fogged vision)
Numbness in half of your face or hand

Write the number of days you have been absent from work or school in the last month because of headaches

**Respiratory Tract**

Do you cough daily in periods of the year? Yes No

If Yes:

Do you usually bring up phlegm when coughing?

Have you had a cough with phlegm for periods of at least 3 months during each of the last two years?

Do you have or have you had hayfever or nasal allergies?

If Yes:

Have you had hayfever/allergy symptoms in the last 12 months?

In the last 12 months have you woken during the night because you were short of breath?

**Muscles and Joints**

In the last year, have you had pain or stiffness in muscles or joints that has lasted at least 3 consecutive months?

Yes No

If No, skip to question 30

If Yes,

Where have you had this pain or stiffness (One or more Xs)

- Neck SHOULDERS FIGURE
Shoulders
Upper back
Elbows
Lower back
Wrists/hands
Hips
Knees

Ankles/feet

Have you had this pain/stiffness on both the right and left side of your body? Yes  No

Does this pain/stiffness hinder your daily activities?

Work Yes  No   
Leisure Yes  No

Have you had back surgery? Yes  No

If Yes,

Type of back surgery

Prolapse/sciatica surgery

Fixation

Other

**Metabolism**

Has it ever been verified that you have/have had:

Hypothyroidism (too low metabolism) Yes  No  If Yes, write age first time Ex: (45 yrs old)  yrs old  
Hyperthyroidism (too high metabolism) Yes  No   yrs old

If Yes:

Did you take Neo-Mercazole?    yrs old

Have you had radioiodine treatment?    yrs old

**Abdomen**

Have you had stomach pain or discomfort in the last 12 months?

Yes, much  Yes, a little  No, never

If No, skip to question 34

If Yes:

Is it localized in the upper stomach? Yes  No

In the last 3 months, have you had this as often as 1 day a week for at least 3 weeks?

Is the pain/discomfort relieved by having a bowel movement?

Is the pain/discomfort related to more frequent or less frequent bowel movements than normal?

Is the pain/discomfort related to the stool being softer or harder than normal?

Do you have this pain/discomfort after eating?

To what degree have you had the following in the last

**12 months:**

Nausea Never  A little  Much   
Heartburn/acid regurgitation     
Diarrhoea     
Constipation     
Alternating constipation and diarrhoea     
Bloating

**How You Feel**

Read each item below and place an X next to the reply that comes closest to how you have been feeling in the past week (only one X per item). Do not take too long over your replies; your immediate reaction to each item will probably be more accurate than a long, thought-out response.

**I feel tense or 'wound up'**

Not at all  From time to time, occasionally  A lot of the time  Most of the time

**I still enjoy the things I used to enjoy**

Definitely as much  Only a little   
Not quite so much  Hardly at all

**I get a sort of frightened feeling as if something awful is about to happen**

Very definitely and quite badly  A little, but it doesn't worry me   
Yes, but not too badly  Not at all

**I can laugh and see the funny side of things**

As much as I always could  Definitely not so much now   
Not quite so much now  Not at all

**Worrying thoughts go through my mind**

A great deal of the time  Not too often   
A lot of the time  Very little

**I feel cheerful**

Never  Sometimes   
Not often  Most of the time

**I can sit at ease and feel relaxed**

Definitely  Not often   
Usually  Not at all

**I feel as if I'm slowed down**

Nearly all the time  Sometimes   
Very often  Not at all

**I get a sort of frightened feeling like 'butterflies' in the stomach**

Not at all  Quite often   
 Occasionally  Very often

**I have lost interest in my appearance**

Definitely  I may not take quite as much care   
 I don't take as much care as I should  I take just as much care as ever

**I feel restless as if I have to be on the move**

Very much indeed  Not very much   
 Quite a lot  Not at all

**I look forward with enjoyment to things**

As much as I ever did  Definitely less than I used to   
 Rather less than I used to  Hardly at all

**I get sudden feelings of panic**

Very often indeed  Not very often   
 Quite often  Not at all

**I can enjoy a good book or radio or TV programme**

Often  Not often   
 Sometimes  Very seldom

**Sleep**

**How often in the last 3 months have you:**

	Seldom/never	Sometimes	Several x a week
Snored loudly (bothersome)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Stopped breathing when you were sleeping ( <b>Sleep apnoea</b> )	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Had difficulty falling asleep at night	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Woken up repeatedly during the night	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Woken too early and couldn't get back to sleep	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Felt sleepy during the day	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Sweat while sleeping (night-time)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Woken with a headache	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Felt an uncomfortable or pins and needles feeling in your legs	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

T

**Alcohol**

*If you do not drink alcohol, skip to question 54.*

Yes No  
 Have you ever felt that you should reduce your alcohol intake?    
 Have other people ever criticised your use of alcohol?    
 Have you ever felt bad or guilty because of your use of alcohol?    
 Have you ever had a drink first thing in the morning as a pick-me-up or to calm your nerves or to cure a hangover?

**Diet**

**How many pieces of bread do you usually eat?**

*Put an X for each type of bread*

	0-4 pr week	5-7 pr week	2-3 pr day	4-5 pr day	6 or more pr day
White bread	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Wholemeal/medium ground	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Multigrain wholemeal/coarsely ground	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

**How often do you normally eat these meals?**

*(One X for each meal)*

	Seldom/never	1-2 x a week	3-4 x a week	5-6 x a week	Every-day
Breakfast	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Lunch	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Warm dinner	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Supper/evening snack	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Other meal	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Midnight snack (24.00-06.00)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

**What type of fat do you most often use? (One X for each line)**

	Butter	Hard marg.	Soft/light margarine	Oils	Don't use
On bread	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
For cooking	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

f

f

**Dental Health**

Have you been to the dentist in the last 12 months? Yes  No

**How would you say your dental health is?**

Very bad  Good   
Bad  Very good   
OK

**Is good dental health important to you?**

Very much  A little   
Much  Svært lite   
Somewhat

**Use of Non-Prescription Medicine**

How often have you taken non-prescription medicine for the following problems in the last month:

	<i>Seldom/ never</i>	<i>1-3 x a week</i>	<i>4-6 x a week</i>	<i>Daily</i>
Heartburn/ acid regurgitation	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Constipation	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Headache	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Pain in muscles/joints	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

**Have you taken any of these non-prescription medicines at least once a week in the last month?**

	Yes	No
Paracetamol, Paracet, Panodil, Pamol, Pinex, Perfalgan	<input type="checkbox"/>	<input type="checkbox"/>
Albyl E (500 mg), Aspirin, Globoid, Dispril	<input type="checkbox"/>	<input type="checkbox"/>
Ibuprofen, Ibux, Ibuprox, Ibumetin, Brufen	<input type="checkbox"/>	<input type="checkbox"/>
Naproxen, Naprosyn, Ledox	<input type="checkbox"/>	<input type="checkbox"/>
Other	<input type="checkbox"/>	<input type="checkbox"/>

**How You Feel Now**

Do you feel, for the most part, strong and fit or tired and worn out?

Very strong and fit   
Strong and fit   
Somewhat strong and fit   
Somewhat in between   
Somewhat tired and worn out   
Tired and worn out   
Very tired and worn out

## Additional Section Men 20-29

### Employment

Is your work so physically demanding that you are often physically worn out after a day's work? (Only one X)

Yes, nearly always  Seldom   
 Quite often  Never, or almost never

Does your work require so much concentration and attention that you often feel worn out after a day's work? (Only one X)

Yes, nearly always  Seldom   
 Quite often  Never, or almost never

All things considered, how much do you enjoy your work? (Only one X)

A great deal  Not much   
 A fair amount  Not at all

### Your Feelings in the Last 14 Days

In the last two weeks, have you: (One X for each line)

	No	A little	A good amount	Very much
Been continuously afraid and anxious	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Felt tense and restless	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Felt hopelessness when you think about the future	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Felt down and sad	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Worried too much about various things	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

### Life Events

Have you experienced any of the following in the last 10 years? (Put an X for each question)

	No		Yes	
		Last 12 mos.		Earlier
Had problems at work or school?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Had financial problems?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Had problems or conflicts with family or friends?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Had big problems in your love life?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Been seriously ill or injured?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Have those nearest you been seriously ill or injured?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

### Eating Habits

Below are listed things that concern your eating habits. Put an X in the boxes according to how they apply to you. (Put an X for each line)

	Never	Seldom	Often	Always
When I first begin eating, it is difficult to stop.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I spend too much time thinking about food.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I feel that food controls my life.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I cut my food into small pieces.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I take longer than others to eat my meals.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Older people think I'm too thin.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I feel that others pressure me to eat.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I vomit after I have eaten.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

### Gambling

	Yes	No
Have you ever felt the need to gamble with continuously increasing amounts of money?	<input type="checkbox"/>	<input type="checkbox"/>
Have you ever had to lie to people who are important to you about how much you lost gambling?	<input type="checkbox"/>	<input type="checkbox"/>

## Additional Section Women 20-29

### Pregnancy and Birth Control

Not including pregnancies or post-natal periods, have you ever not menstruated for at least 6 months?

Yes  No

If Yes,

How many times?  times

Including all pregnancies, how many times have you been pregnant?  times

Have you ever tried for more than one year to become pregnant? Yes  No

If Yes,

How old were you the first time you had problems becoming pregnant?  yrs old

Do you use/take or have you used/taken:

	Now	Before, but not now	Never
Birth control pills	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Birth control patch	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Other hormone birth control (Injection, vaginal ring, implant, IUD/coil)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

If you have taken birth control pills:

How old were you when you first began taking them?  yrs old

How many years in total have you taken birth control pills?

Less than 1 yr  1-3 yrs  4-10 yrs  over 10 yrs

### Urinary Tract

Do you unintentionally leak urine? Yes  No

If No, skip to question 72

If Yes:

How often do you leak urine?

Less than once a month  One or more times a week   
 One or more times a month  Every day/night

How much urine usually leaks each time?

Drops  Small amount  Quite a lot

Do you leak urine when you cough, sneeze, laugh or lift something heavy? Yes  No

When you leak urine is it accompanied by a sudden and strong urge to urinate?

How do you feel about having urinary incontinence?

Not a problem  A great problem   
 A slight problem  A very great problem   
 A moderate problem

### Employment

Is your work so physically demanding that you are often physically worn out after a day's work? (Only one X)

Yes, nearly always  Seldom   
 Quite often  Never, or almost never

Does your work require so much concentration and attention that you often feel worn out after a day's work? (Only one X)

Yes, nearly always  Seldom   
 Quite often  Never, or almost never

All things considered, how much do you enjoy your work? (Only one X)

A great deal  Not much   
 A fair amount  Not at all

### Your Feelings in the Last 14 Days

In the last two weeks, have you: (One X for each line)

	No	A little	A good amount	Very much
Been continuously afraid and anxious	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Felt tense and restless	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Felt hopelessness when you think about the future	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Felt down and sad	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Worried too much about various things	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

**Life Events**

Have you experienced any of the following in the last 10 years? (Put an X for each question)

	No	Yes	
		Last 12 mos.	Earlier
Had problems at work or school?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Had financial problems?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Had problems or conflicts with family or friends?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Had big problems in your love life?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Been seriously ill or injured?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Have those nearest you been seriously ill or injured?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

**Eating Habits**

Below are listed things that concern your eating habits. Put an X in the boxes according to how they apply to you. (Put an X for each line)

	Never	Seldom	Often	Always
When I first begin eating, it is difficult to stop.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I spend too much time thinking about food.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I feel that food controls my life.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I cut my food into small pieces.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I take longer than others to eat my meals.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Older people think I'm too thin.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I feel that others pressure me to eat.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I vomit after I have eaten.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

**Gambling**

Have you ever felt the need to gamble with continuously increasing amounts of money?  Yes  No

Have you ever had to lie to people who are important to you about how much you lost gambling?  Yes  No

## Additional Section Men 30-69

### Evaluating Your Job

Answer if you are or have been employed.

Respond to the following statements/questions about where you work.

#### There is a good collegiality at work.

Strongly agree  Agree   
Disagree  Strongly disagree

#### My co-workers are there for me (support me).

Strongly agree  Agree   
Disagree  Strongly disagree

#### I get along well with my co-workers.

Strongly agree  Agree   
Disagree  Strongly disagree

#### Are you bullied/ harassed at work?

Yes, often  Yes, sometimes   
No, seldom  No, could say never

#### Does your job require you to work very fast?

Yes, often  Yes, sometimes   
No, seldom  No, could say never

#### Does your job require you to work very hard?

Yes, often  Yes, sometimes   
No, seldom  No, could say never

#### Does your job require too great a work effort?

Yes, often  Yes, sometimes   
No, seldom  No, could say never

#### Does your job require creativity?

Yes, often  Yes, sometimes   
No, seldom  No, could say never

#### Do you have the possibility to decide for yourself how to carry out your work?

Yes, often  Yes, sometimes   
No, seldom  No, could say never

#### Do you have the possibility to decide for yourself what should be done in your work?

Yes, often  Yes, sometimes

No, seldom  No, could say never

#### Is your work so physically demanding that you are often physically worn out after a long day's work?

Yes, nearly always  Seldom   
Quite often  Never, or almost never

### Leg Pain

Do you have ulcer(s) on your toes, foot ankle that will not heal? Yes  No

Do you have pain in one or both legs when you walk?

#### If Yes, Where does it hurt the most?

Foot  Leg  Thigh  Hip

Does the pain go away if you stand still a while? Yes  No

Do you have pain in your legs when you are resting?

#### If Yes:

Is the pain worse when you lay in bed?

Do you have less pain if you have your legs lower, such as over the edge of the bed?

Have you had pain in your legs continuously for more than 14 days?

Have you taken pain relievers because of pain in your legs?

### Vision

Do you have any of the following eye conditions? Yes No

Cataract

Glaucoma (raised eye pressure)

Age-Related Macular Degeneration (retinal calcification)

### Memory

Do you have problems with your memory?

No, none  Yes, some  Yes, a lot



**Has your memory changed since you were younger?**

No  Yes, some  Yes, a lot

**Do you have trouble remembering:**

Never Sometimes Often

Things that happened a few minutes ago?     
Other peoples' names?     
Dates?     
To do something you have planned to do?     
Things that happened a few days ago?     
Things that happened years ago?     
Enough to be able to follow along in a conversation?

**Urinary Tract**

**How often do you usually urinate during the day?**

1-4 times  8-11 times   
5-7 times  More than 11 times

**How many times do you get up during the night to urinate?**

None  1  2  3  4 or more  5 or more

**If you get up during the night to urinate, is this a problem for you?**

Not a problem  It's a problem   
Somewhat of a problem  It's a very big problem

**Do you feel a sudden, compelling urge to urinate that is difficult to suppress?**

Never  Several times a week   
Monthly  Daily

**Over the past month, how often have you had a sensation of not emptying your bladder completely after you finish urinating?**

Never  1 out of 3 times  2 out of 3 times   
1 out of 5 times  1 out of 2 times  Almost always

**Over the past month, how often have you had to urinate again less than 2 hours after you finished urinating?**

Never  1 out of 3 times  2 out of 3 times   
1 out of 5 times  1 out of 2 times  Almost always

**Over the past month, how often have you found you stopped and started again several times when**

**you urinated?**

Never  1 out of 3 times  2 av 3 ganger   
1 out of 5 times  1 av 2 ganger  Nesten alltid

**Over the last month, how difficult have you found it to postpone urination?**

Never  1 out of 3 times  2 out of 3 times   
1 out of 5 times  1 out of 2 times  Almost always

**Over the past month, how often have you had a weak urinary stream?**

Never  1 out of 3 times  2 out of 3 times   
1 out of 5 times  1 out of 2 times  Almost always

**Over the past month, how often have you had to push or strain to begin urination?**

Never  1 out of 3 times  2 out of 3 times   
1 out of 5 times  1 out of 2 times  Almost always

**Do you unintentionally leak urine?**

Yes  No

*(If No, skip to question about 93)*

**If Yes:**

**How often do you leak urine?**

Less than once a month  One or more times a week   
Several times a month  Every day/night

**How much urine usually leaks each time?**

Drops  A small amount  Quite a lot

**In which situations might you leak urine?**

*(You may X several answers)*

When you cough, sneeze, lift something heavy   
When having a sudden urge to urinate   
Drops at end of or after urinating   
Drops all the time, independent of urinating

**How do you feel about having urinary incontinence?**

Not a problem  A great problem   
A slight problem  A very great problem   
A moderate problem

**How old were you when you became incontinent?**

yrs old

**Have you consulted a doctor**

Yes  No

because of urinary incontinence?

### Additional Section Women 30-69

#### Menstruation, Birth Control and Pregnancy

Not including during pregnancy or post-natal period, have you ever not gotten a period for at least 6 months (premenopause)?

Yes  No

If Yes,

How many times?

times

In total, how many times have you been pregnant?

times

Have you ever tried for more than one year to become pregnant?

Yes  No

If Yes,

How old were you the first time you tried to become pregnant?

yrs old

Have you ever received hormone treatment to become pregnant?

Yes  No

If Yes,

Have you received this treatment in the last 3 months?

Do you use/take or have you used/taken:

Now Before, but not now Never

Birth control pills

Birth control patch

Other hormone birth control (injection, vaginal ring, implant, IUD/coil)

If you have taken birth control pills:

How old were you when you first began taking them?

yrs old

How many years in total have you taken birth control pills?

Less than 1 yr  1-3 yrs  4-10 yrs  Over 10 yrs

#### Menopause

(If you are premenopausal, skip to 75)

Do you have/have you had hot flashes due to menopause?

During the day  During night  Day and night  Haven't had any

If you have had hot flashes, how would you describe

them?

Very intense  Moderately intense  Hardly noticeable

Have you been to a doctor because of this?

No  Yes

Have you ever taken/used medicine that contains oestrogen?

Now Previously Never

Tablets or patches (prescribed by a doctor)  
Creams or suppositories

If you have taken/used prescription oestrogen:

How old were you when you began?

yrs old

How old are/were you the last time you took/used it?

yrs old

If you take/use or have taken/used oestrogen tablets or patches, why did you begin?

Alleviate menopausal symptoms   
Prevent osteoporosis   
Other

If you have previously taken/used oestrogen tablets or patches, why did you stop?

No longer have/had symptoms  Afraid of side effects   
Experienced bothersome side effects  Other

#### Operations/Radiation Therapy in the Lower Abdomen

Have you had both ovaries surgically removed?

No  Yes  Don't know

If Yes,

How old were you then?

yrs old

Have you had your womb surgically removed (hysterectomy)?

No  Yes  Don't know

If Yes,

How old were you then?

yrs old

Have you ever had radiation therapy in your pelvic region?

No  Yes  Don't know

If Yes,

How old were you then?

yrs old

**Urinary Tract**

**How often do you usually urinate during the day?**

1-4 times  8-11 times   
5-7 times  over 11 times

**How many times do you get up during the night to urinate?**

None  1  2  3  4 or more

**If you get up during the night to urinate, is this a problem for you?**

Not a problem  It's a problem   
Somewhat of a problem  It's a very big problem

**Do you feel a sudden, compelling urge to urinate that is difficult to suppress?**

Never  Several times a week   
Monthly  Daily

**Do you unintentionally leak urine?** Yes  No

*If No, skip to question 84*

**If Yes:**

**How often do you leak urine?**

Less than once a month  One or more times a week   
One or more times a month  Every day/night

**How much urine usually leaks each time?**

Drops  Small amount  Quite a lot

**Do you leak urine when you cough, sneeze, laugh or lift something heavy?** Yes  No

**When you leak urine is it accompanied by a sudden and strong urge to urinate?**

**How do you feel about having urinary incontinence?**

Not a problem  A great problem   
A slight problem  A very great problem   
A moderate problem

**How old were you when you became incontinent?**  yrs old

**Have you consulted a doctor because of urinary incontinence?** Yes  No

**Have you ever been treated for urinary incontinence?** *(Several Xs possible here)*

No, I have never had urinary incontinence   
No, I had urinary incontinence, but became better on its own   
Yes

**If Yes, what type of treatment?**

Operation  Medicine   
Pelvic floor exercises  Other

**Bowel Movements**

**Have you had uncontrollable flatulence in the last month?**

Never/seldom  Weekly  Daily

**Have you leaked stool (faecal incontinence) in the last month?**

Never/seldom  Weekly  Daily

**If you answered Yes to one of the above questions, does faecal incontinence affect your daily life?**

Never/seldom  Weekly  Daily

**Are you able to hold back the stool for 15 minutes after you first feel the urge to evacuate your bowels?** Yes  No

**Evaluating Your Job**

*Answer if you are or have been employed.*

*Respond to the following statements/questions about where you work.*

**There is a good collegiality at work.**

Strongly agree  Agree   
Disagree  Strongly disagree

**My co-workers are there for me (support me).**

Strongly agree  Agree   
Disagree  Strongly disagree

**I get along well with my co-workers.**

Strongly agree  Agree   
Disagree  Strongly disagree

**Are you bullied/ harassed at work?**

Yes, often  Yes, sometimes   
 No, seldom  No, could say never

**Does your job require you to work very fast?**  
 Yes, often  Yes, sometimes   
 No, seldom  No, could say never

**Does your job require you to work very hard?**  
 Yes, often  Yes, sometimes   
 No, seldom  No, could say never

**Does your job require too great a work effort?**  
 Yes, often  Yes, sometimes   
 No, seldom  No, could say never

**Does your job require creativity?**  
 Yes, often  Yes, sometimes   
 No, seldom  No, could say never

**Do you have the possibility to decide for yourself how to carry out your work?**  
 Yes, often  Yes, sometimes   
 No, seldom  No, could say never

**Do you have the possibility to decide for yourself what should be done in your work?**  
 Yes, often  Yes, sometimes

**Leg Pain**

**Do you have ulcer(s) on your toes, foot ankle that will not heal?** Yes  No

**Do you have pain in one or both legs when you walk?**

**If Yes, Where does it hurt the most?**  
 Foot  Leg  Thigh  Hip

**Does the pain go away if you stand still a while?** Yes  No

**Do you have pain in your legs when you are resting?**

**If Yes: Is the pain worse when you lay in bed?**

**Do you have less pain if you have your legs lower, such as over the edge of the bed?**

**Have you had pain in your legs continuously for more than 14 days?**

**Have you taken pain relievers because of pain in your legs?**

**Vision**

**Do you have any of the following eye conditions?** Yes No  
 Cataract    
 Glaucoma (raised eye pressure)    
 Age-Related Macular Degeneration (retinal calcification)

**Memory**

**Do you have problems with your memory?**  
 No, none  Yes, some  Yes, a lot

**Has your memory changed since you were younger?**  
 No  Yes, some  Yes, a lot

**Do you have trouble remembering:** Never Sometimes Often  
 Things that happened a few minutes ago?     
 Other peoples' names?     
 Dates?     
 To do something you have planned to do?     
 Things that happened a few days ago?     
 Things that happened years ago?     
 Enough to be able to follow along in a conversation?

**Eating Disorders**

Place a circle around the number that best describes your eating habits during the last month.

**Are you satisfied with your eating habits?**  
 Very satisfied 1 2 3 4 5 6 7 Very disatisfied

**Have you eaten to comfort yourself or because you were unhappy?**  
 Not at all 1 2 3 4 5 6 7 Every-day

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**Have you felt guilty about eating?**

Not at all      1   2   3   4   5   6   7      Every-day

**Have you felt that it was necessary for you to use a strict diet or other eating rituals to control your eating?**

Not at all      1   2   3   4   5   6   7      Every-day

**Have you felt that you are too fat?**

Not at all      1   2   3   4   5   6   7      Every-day

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## Additional Section Men 70+

### Leg Pain

Do you have ulcer(s) on your toes, foot ankle that will not heal? Yes  No

Do you have pain in one or both legs when you walk?

If Yes,

Where does it hurt the most?

Foot  Leg  Thigh  Hip

Does the pain go away if you stand still a while? Yes  No

Do you have pain in your legs when you are resting?

If Yes:

Is the pain worse when you lay in bed?

Do you have less pain if you have your legs lower, such as over the edge of the bed?

Have you had pain in your legs continuously for more than 14 days?

Have you taken pain relievers because of pain in your legs?

### Activities of Daily Life

Can you do the following daily tasks without the help of others?

Walk around indoors on the same floor Yes  No

Go to the toilet

Wash yourself

Take a bath or shower

Dress and undress yourself

Go to bed and get up

Eat

### Other Daily Tasks

Do you have a driver's licence? Yes  No

If Yes, Do you still drive a car? Yes  No

Can you do the following daily tasks without the help of others?

Prepare warm meals Yes  No

Do light housework (ex: wash dishes)

Do heavier housework (ex: wash floors)

Wash clothes

Do the shopping

Pay bills

Take medicines

Go out

Take the bus

### Memory

Do you have problems with your memory?

No, none  Yes, some  Yes, a lot

Has your memory changed since you were younger?

No  Yes, some  Yes, a lot

Do you have trouble remembering:

Things that happened a few minutes ago? Never  Sometimes  Often

Other peoples' names?

Dates?

To do something you have planned to do?

Things that happened a few days ago?

Things that happened years ago?

Enough to be able to follow along in a conversation?

### Falls

Have you fallen and hurt yourself in the last year? No  Yes

If Yes,

Where did it happen? Indoors  Outdoors

Have you been to a doctor in the last year because of an injury caused by a fall? Yes  No

Have you been admitted to hospital in the last year because of an injury

caused by a fall?

Have you fallen in the last 3 months?

Do you have problems with your balance?

**Use of Health Services**

Have you had home care help in the last 12 months? Yes  No

If Yes, Do you have enough home care help?

Have you received home nursing care in the last 12 months?

If Yes, Do you receive enough home nursing care?

Have you been admitted to a nursing home in the last 12 months?

**Vision**

Do you have any of the following eye conditions? Yes No

Cataract

Glaucoma (raised eye pressure)

Age-Related Macular Degeneration (retinal calcification)

**Urinary Tract**

How often do you usually urinate during the day?

1-4 times  8-11 times

5-7 times  More than 11 times

How many times do you get up during the night to urinate?

None  1  2  3  4 or more

If you get up during the night to urinate, is this a problem for you?

Not a problem  It's a problem

Somewhat of a problem  It's a very big problem

Do you feel a sudden, compelling urge to urinate that is difficult to suppress?

Never  Several times a week

Monthly  Daily

Over the past month, how often have you had a

sensation of not emptying your bladder completely after you finish urinating?

Never  1 out of 3 times  2 out of 3 times

1 out of 5 times  1 out of 2 times  Almost always

Over the past month, how often have you had to urinate again less than 2 hours after you finished urinating?

Never  1 out of 3 times  2 out of 3 times

1 out of 5 times  1 out of 2 times  Almost always

Over the past month, how often have you found you stopped and started again several times when you urinated?

Never  1 out of 3 times  2 av 3 ganger

1 out of 5 times  1 av 2 ganger  Nesten alltid

Over the last month, how difficult have you found it to postpone urination?

Never  1 out of 3 times  2 out of 3 times

1 out of 5 times  1 out of 2 times  Almost always

Over the past month, how often have you had a weak urinary stream?

Never  1 out of 3 times  2 out of 3 times

1 out of 5 times  1 out of 2 times  Almost always

Over the past month, how often have you had to push or strain to begin urination?

Never  1 out of 3 times  2 out of 3 times

1 out of 5 times  1 out of 2 times  Almost always

Do you unintentionally leak urine? Yes  No

If No, skip to question about 89

If Yes:

How often do you leak urine?

Less than once a month  One or more times a week

Several times a month  Every day/night

How much urine usually leaks each time?

Drops  Small amounts  Quite a lot

In which situations might you leak urine?

(You may X several answers)

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- When you cough, sneeze, lift something heavy
- When having a sudden urge to urinate
- Drops at end of or after urinating
- Drops all the time, independent of urinating

**How do you feel about having urinary incontinence?**

- Not a problem  A great problem
- A slight problem  A very great problem
- A moderate problem

**How old were you when you became incontinent?**  yrs old

**Have you consulted a doctor because of urinary incontinence?** Yes  No

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## Additional Section Women 70+

### Pregnancy, Children and Hormone Therapy

In total, how many times have you been pregnant?  times

Have you ever tried for more than one year to become pregnant? Yes  No

If Yes,  
How old were you the first time you had problems becoming pregnant?  yrs old

Do you have/have you had hot flashes due to menopause?

During the day  During night  Day and night  Haven't had any

If you have had hot flashes, how would you describe them?

Very intense  Moderately intense  Hardly noticeable

Have you been to a doctor because of this? No  Yes

Have you ever taken/used medicine that contains oestrogen? *Now* *Previously* *Never*

Tablets or patches (prescribed by a doctor)

Cream or suppositories

If you have taken/used prescription oestrogen:

How old were you when you began?  yrs old

How old are/were you the last time you took/used it?  yrs old

If you take/use or have taken/used oestrogen tablets or patches, why did you begin?

Alleviate menapausal symptoms

Prevent osteoporosis

Other

If you have previously taken/used oestrogen tablets or patches, why did you stop?

No longer have/had symptoms  Afraid of side effects

Experienced bothersome side effects  Other

### Operations/Radiation Therapy in the Lower Abdomen

Have you had both ovaries surgically removed?

No  Yes  Don't know

If Yes,  
How old were you then?  yrs old

Have you had your womb surgically removed (hysterectomy)?

No  Yes  Don't know

If Yes,  
How old were you then?  yrs old

Have you ever had radiation therapy in your pelvic region?

No  Yes  Don't know

If Yes,  
How old were you then?  yrs old

### Urinary Tract

How often do you usually urinate during the day?

1-4 times  8-11 times

5-7 times  over 11 times

How many times do you get up during the night to urinate?

None  1  2  3  4 or more

If you get up during the night to urinate, is this a problem for you?

Not a problem  It's a problem

Somewhat of a problem  It's a very big problem

Do you feel a sudden, compelling urge to urinate that is difficult to suppress?

Never  Several times a week

Monthly  Daily

Do you unintentionally leak urine? Yes  No

If No, skip to question 79

If Yes:

How often do you leak urine?

Less than once a month  One or more times a week

One or more times a month  Every day/night

**How much urine usually leaks each time?**  
 Drops  Small amount  Quite a lot

**Do you leak urine when you cough, sneeze, laugh or lift something heavy?** Yes  No

**When you leak urine is it accompanied by a sudden and strong urge to urinate?**

**How do you feel about having urinary incontinence?**  
 Not a problem  A slight problem  A moderate problem   
 A great problem  A very great problem

**How old were you when you became incontinent?**  yrs old  
**Have you consulted a doctor because of urinary incontinence?** Yes  No

**Have you ever been treated for urinary incontinence? (Several Xs possible here)**  
 No, I have never had urinary incontinence   
 No, I had urinary incontinence, but became better on its own   
 Yes

**If Yes, what type of treatment?**  
 Operation  Pelvic floor exercises   
 Medicine  Other

**Bowel Movements**

**Have you had uncontrollable flatulence in the last month?**  
 Never/seldom  Weekly  Daily

**Have you leaked stool (faecal incontinence) in the last month?**  
 Never/seldom  Weekly  Daily

**If you answered Yes to one of the above questions, does faecal incontinence affect your daily life?**  
 Never/seldom  Weekly  Daily

**Are you able to hold back the stool for 15 minutes after you first feel the urge to evacuate your bowels?** Yes  No

**Leg Pain**  
**Do you have ulcer(s) on your toes, foot ankle that will not heal?** Yes  No

**Do you have pain in one or both legs when you walk?**

**If Yes, Where does it hurt the most?**  
 Foot  Leg  Thigh  Hip

**Does the pain go away if you stand still a while?** Yes  No

**Do you have pain in your legs when you are resting?**

**If Yes: Is the pain worse when you lay in bed?**

**Do you have less pain if you have your legs lower, such as over the edge of the bed?**

**Have you had pain in your legs continuously for more than 14 days?**

**Have you taken pain relievers because of pain in your legs?**

**Activities of Daily Life**

**Can you do the following daily tasks without the help of others?**

	Yes	No
Walk around indoors on the same floor	<input type="checkbox"/>	<input type="checkbox"/>
Go to the toilet	<input type="checkbox"/>	<input type="checkbox"/>
Wash yourself	<input type="checkbox"/>	<input type="checkbox"/>
Take a bath or shower	<input type="checkbox"/>	<input type="checkbox"/>
Dress and undress yourself	<input type="checkbox"/>	<input type="checkbox"/>
Go to bed and get up	<input type="checkbox"/>	<input type="checkbox"/>
Eat	<input type="checkbox"/>	<input type="checkbox"/>

**Other Daily Tasks**

**Do you have a driver's licence?** Yes  No   
**If Yes, Do you still drive?** Yes  No

**Can you do the following daily tasks without the help of others?**  
 Yes  No

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Prepare warm meals	<input type="checkbox"/>	<input type="checkbox"/>
Do light housework (ex: wash dishes)	<input type="checkbox"/>	<input type="checkbox"/>
Do heavier housework (ex: wash floors)	<input type="checkbox"/>	<input type="checkbox"/>
Wash clothes	<input type="checkbox"/>	<input type="checkbox"/>
Do the shopping	<input type="checkbox"/>	<input type="checkbox"/>
Pay bills	<input type="checkbox"/>	<input type="checkbox"/>
Take medicines	<input type="checkbox"/>	<input type="checkbox"/>
Go out	<input type="checkbox"/>	<input type="checkbox"/>
Take the bus	<input type="checkbox"/>	<input type="checkbox"/>

**Memory****Do you have problems with your memory?**No, none  Yes, some  Yes, a lot **Has your memory changed since you were younger?**No  Yes, some  Yes, a lot **Do you have trouble remembering:**

Never Sometimes Often

Things that happened a few minutes ago?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Other peoples' names?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Dates?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
To do something you have planned to do?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Things that happened a few days ago?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Things that happened years ago?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Enough to be able to follow along in a conversation?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

**Falls****Have you fallen and hurt yourself in the last year?** No  Yes **If Yes,****Where did it happen?** Indoors  Outdoors **Have you been to a doctor in the last year because of an injury caused by a fall?** Yes  No **Have you been admitted to hospital in the last year because of an injury caused by a fall?**  **Have you fallen in the last 3 months?**  **Do you have problems with your balance?**  **Use of Health Services**

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**Have you had home care help in the last 12 months?**Yes  No **If Yes, Do you have enough home care help?**  **Have you received home nursing care in the last 12 months?**  **If Yes, Do you receive enough home nursing care?**  **Have you been admitted to a nursing home in the last 12 months?****Vision****Do you have any of the following eye conditions?** Yes No

Cataract	<input type="checkbox"/>	<input type="checkbox"/>
Glaucoma (raised eye pressure)	<input type="checkbox"/>	<input type="checkbox"/>
Age-Related Macular Degeneration (retinal calcification)	<input type="checkbox"/>	<input type="checkbox"/>

Fra: Regional komite for medisinsk og helsefaglig forskningsetikk REK midt

Til:

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Dokumentreferanse: 2010/2663-3

Dokumentdato: 15.11.2010

#### FYSISK AKTIVITET OG MENTAL HELSE INFORMASJON OM VEDTAK

Med hjemmel i lov om behandling av etikk og redelighet i forskning § 4 og helseforskningsloven (hfl.) § 10 har Regional komité for medisinsk og helsefaglig forskningsetikk Midt-Norge vurdert prosjektet i sitt møte 29. oktober 2010. Komiteen viser til prosjektprotokoll, målsetting og plan for gjennomføring, og finner at prosjektet har et forsvarlig opplegg som kan gjennomføres under henvisning til evt. merknader og vilkår for godkjenning, jf. hfl. § 5.

#### **Merknader og vilkår:**

- Komiteen finner at prosjektet ligger klart innenfor de rammer som er lagt for Helseundersøkelsen i Nord-Trøndelag (HUNT) og innenfor det samtykke som deltakerne har gitt til bruk av dette materialet.
- Komiteen ber om at grunnlagsdata ikke blir anonymisert, slettet eller destruert, men blir oppbevart på en tryggende måte i minimum 5 år etter prosjektslutt av kontrollenssyn. Instanser som kan tenkes å kontrollere grunnlagsmaterialet er f.eks. forskningsansvarlige, Uredelighetsutvalget for forskning og Helsetilsynet.
- Prosjektleder skal sende sluttmelding til den regionale komiteen for medisinsk og helsefaglig forskningsetikk når forskningsprosjektet avsluttes. I sluttmeldingen skal resultatene presenteres på en objektiv og etterrettelig måte, som sikrer at både positive og negative funn fremgår, jf. hfl. § 12.

#### **Vedtak :**

**"Regional komité for medisinsk og helsefaglig forskningsetikk, Midt-Norge godkjenner at prosjektet gjennomføres med de vilkår som er gitt."**

Vedtaket kan påklages og klagefristen er tre uker fra mottagelsen av dette brev, jf. hfl. § 10 og fvl. §§ 28 og 29. Klageinstans er Den nasjonale forskningsetiske komité for medisin og helsefag (NEM), men en eventuell klage skal rettes til REK Midt-Norge. Avgjørelsen i NEM er endelig. Det følger av fvl. § 18 at en part har rett til å gjøre seg kjent med sakens dokumenter, med mindre annet følger av de unntak loven oppstiller i §§ 18 og 19.

Vennlig hilsen

Sven Erik Gisvold  
leder, REK Midt

Hilde Eikemo  
rådgiver, REK Midt