Master's thesis

NTNU
Norwegian University of Science and Technology
Faculty of Medicine and Health Sciences
Department of Neuromedicine and Movement Science

Fatemeh Mohammad Beigi

The association between rheumatoid arthritis and daily life functioning in adults - The HUNT4 study

Master's thesis in Physical activity and health - Movement science
Supervisor: Prof. Beatrix Vereijken
Co-supervisor: Skender Elez Redzovic, Yi-Qian Sun, & Prof. Geir Aamodt

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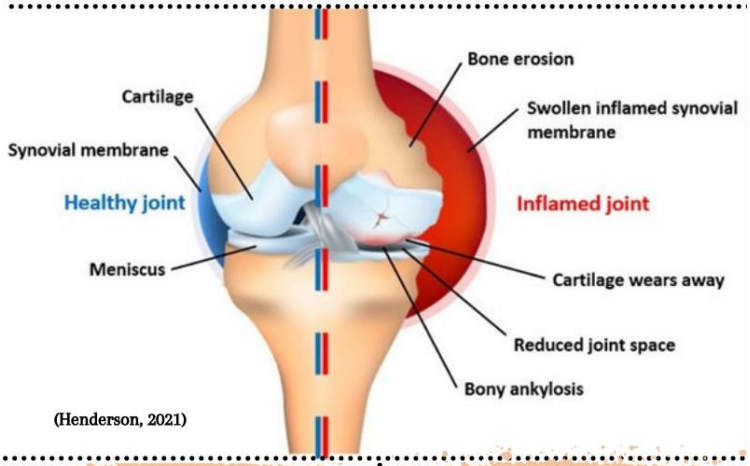
Rheumatoid arthritis

Joint destructive progressive autoimmune disease



(Henderson, 2021)

Risks

Exercise	Age
Education	Sex
Genetic	Body fat
Chronic diseases	

ADL

ACTIVITIES OF DAILY LIVING

Open jar	Dress
Bed	Bend
Drink	Car
Walk outside	Wash

Results:

RA decreases the quality of ADL.

The prevalence of RA is higher in females than males.

The prevalence of RA increases with age.

Adjusted for confounders:
Age, Sex, Education, Exercise, Body fat (%), Chronic diseases.

ACKNOWLEDGEMENTS

This research was performed at the Department of Neuromedicine and Movement Science, Faculty of Medicine and Health Sciences, Norwegian University of Science and Technology (NTNU).

I would like to express my deepest gratitude to my supervisors, Professor Beatrix Vereijken, Associate Professor Skender Elez Redzovic, Researcher Yi-Qian Sun, and Professor Geir Aamodt. Their sincerity and encouragement I will never forget. They have been an inspiration as I hurdled through the path of this master's degree. They are the true definition of the ultimate role models. This thesis would not have been possible without Professor Beatrix Vereijken, whose guidance from the initial step in research enabled me to develop an understanding of the subject. I am thankful for the extraordinary experiences she arranged for me and for providing opportunities for me to grow professionally. It is an honor to learn from all of my supervisors.

I also would like to express my thanks to all my respected teachers at NTNU. My friends deserve my thanks who directly and indirectly provided me with inspirations and emotional support during the course of this study.

ABSTRACT

Background: Rheumatoid arthritis (RA) is a chronic, joint destructive progressive autoimmune disease, with 0.24% worldwide prevalence, that causes functional disability and significant pain, and may lead to premature mortality. There is a lack of studies about the association between RA and activities of daily living (ADL) and instrumental activities of daily living (IADL). Furthermore, a potential difference between genders is also a significant knowledge gap. ***Objectives:*** This study investigated the potential association between RA and ADL/IADL in adults, as well as potential differences between genders. ***Methods:*** A population-based cross-sectional study was conducted using data from the HUNT4 Arthritis study from 2017-2019, with a total of 2684 participants enrolled in the current study. The participants were divided into following two groups: non-RA group (reference group) (n=1682) and RA patients (n=1002). The association between RA and several main ADLs/IADLs (Wearing clothes, get in/out of bed, lifting a glass and drinking, personal hygiene, bending to pick up a thing, opening a jar, getting in/out of car, and walking outside) was assessed using linear regression, adjusted for the potential confounders of age, sex, education, exercise, body fat (%), and chronic diseases. Furthermore, family history was investigated as an ancestor to RA. The most worsen ADLs/IADLs were identified overall and between genders. ***Results:*** Results indicated RA estimated prevalence was 1.7% in the HUNT4 study. In women, prevalence of RA was 1.21% and for men 0.57% in the HUNT4 study. There is a significant association between RA and ADL in adults. Significantly associated ADLs/IADLs overall were get in/out of bed, opening a jar, bending to pick up a thing, and getting in/out of car. For female RA patients, get in/out of bed and opening a jar were significantly associated. For male RA patients, only getting in/out of car was significantly associated. ***Conclusion:*** This research indicated that there is a significant association between RA and ADLs in Norwegian people, based on data from HUNT4. Women are more at risk of RA than men, and RA worsen women's ADL/IADL more.

Keywords: *Rheumatoid arthritis (RA), ADL, IADL, Prevalence, Sex, HUNT4*

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ABBREVIATIONS

ADL: Activities of daily living

CI: Confidence interval

DAG: Directed acyclic graph

IADL: Instrumental Activities of daily living

MSK: Musculoskeletal

OR: Odds ratio

RA: Rheumatoid arthritis

REK: The regional committee for medical and health research ethics

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INTRODUCTION

Physical and functional abilities are important for being able to live independently, but independence can be hindered by joint discomfort and pain. Joint disorders can occur in all age groups, but the prevalence increases with age (Loeser, 2010). However, the increase in life expectancy and the subsequent ageing population has led to a higher prevalence of chronic, non-communicable diseases and musculoskeletal (MSK) disorders (Prince, 2015). Arthritis is a common clinical manifestation of rheumatic diseases. It can be a clinical feature in many rheumatic diseases, including rheumatoid arthritis (RA), spondylarthritis, crystal-induced arthritis, systemic lupus erythematosus, and Sjögren's syndrome (Senthelal, 2021). RA is a chronic, joint destructive progressive autoimmune disease that causes functional disability, significant pain, and leads to premature mortality (Kvien, 2004).

The worldwide prevalence of RA has been estimated as 0.24 % based upon the Global Burden of Disease 2010 Study (Cross et al., 2014). RA has a predilection to influence women, in whom incidence and prevalence rates of RA are twice as high as in men. In women, higher body fat percentage, higher waist circumference, and obesity have been associated with a higher risk of RA (Linauskas et al., 2019). The lifetime risk of developing RA is 3.6 % in women and 1.7 % in men (Crowson et al., 2011). RA patients with a higher level of education have a slightly greater chance of pain remission and improvement in physical function, whereas educational background has limited influence on the disease course (Jiang, 2015). Aging is associated with increased prevalence of cardiovascular disease and osteoporosis, both of which are overrepresented as comorbidities in patients with RA compared to the general population (Onna, 2016).

Activities of daily living (ADL) is a term used to describe crucial skills for an independent lifestyle, such as eating, hygiene, and mobility. The term was first posed by Sidney Katz in 1950 (Katz, 1983; Bieńkiewicz, 2014). The inability to perform essential ADLs and instrumental Activities of daily living (IADL) such as getting in / out of car or walking out, can lead to hazardous conditions and inadequate quality of life. Chronic illnesses progress over time, causing a physical decline that may lead to a loss of ability to perform ADLs and IADLs (Edemekong et al, 2022). Good physical and functional abilities allow humans to be mobile and move around, thereby being an important driver for independence. Aging and diseases that cause limitations or pain in joints can influence balance and lower limb strength, thereby potentially decreasing mobility and jeopardizing independence in daily life (Thurlings, 2017).

Diseases such as RA affect both people and society with its consequences such as altering the quality of people's ADLs and IADLs. There is a lack of population-based studies investigating the association between RA and ADL. Furthermore, there is a lack of knowledge about which ADL / IADL are harder to operate because of RA. Gender studies are conducted in many fields to show the difference between exposures and outcomes for men and women. In this thesis, I will focus on these three topics: the association between RA and ADL and how the association may differ in men and women. Also, the prevalence of RA in HUNT4 study.

RA disease progression

Arthritis can be categorized into multiple categories, the most prevalent ones being RA, osteoarthritis, and spondylarthritis (Akhondi, 2019). RA is a chronic, symmetrical, inflammatory autoimmune disease that initially affects small joints, progressing to larger joints, and eventually the skin and internal organs. Often, the bone and cartilage of joints are damaged, and tendons and ligaments weaken. Common symptoms of RA include morning stiffness of the affected joints for > 30 min, fatigue, fever, weight loss, joints that are tender, swollen, and warm, and rheumatoid nodules under the skin. (Bullock, 2018)

RA can be mild, moderate, or severe, and symptoms vary from person to person. The disorder tends to worsen over time, advancing through various stages. Progression of RA is classified into four stages. The first stage is an early stage in which patients feel discomfort, swelling and stiffness. During this stage, the inflammation is inside the joint. The second stage is called a moderate stage in which inflammation causes damage to joint cartilage. In this stage, pain and loss of mobility are noticeable. The third stage is considered severe. Damage extends from the joints to bones and some deformity may occur. In the fourth and last stage, joints stop working and bones become fused together which is called ankylosis (Lovering, 2021).Important measurements in the comprehensive management of RA in all stages are patient knowledge about RA, psychosocial interventions, rest and exercise, and nutrition (Cooney, 2011).

Management strategies for patients with RA are through controlling inflamed layers of connective tissue that lines the cavities of joints and the prevention of joint injury (Guo, 2018).

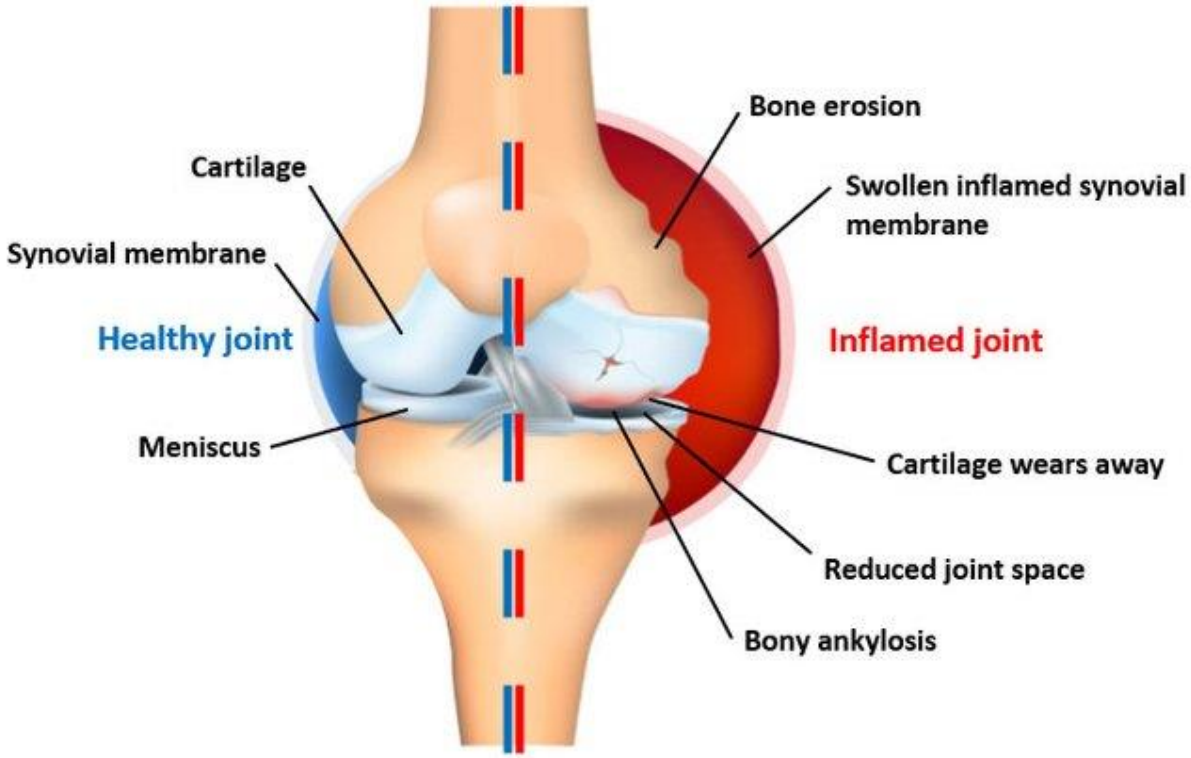

Figure 1 RA (Right) versus healthy joint (left) (Henderson, 2021).

Study aims

To address the gaps in our knowledge as described above, the current study will investigate the following research questions:

- What is the association between RA and daily life functioning and does this association differ between females and males?
- What is the prevalence of RA in HUNT4 study?

This research question will be investigated using data from the HUNT4 study, specifically the Arthritis Survey Questionnaire, and consider age, gender, education, body fat percentage, exercise, and other chronic diseases.

METHODS

Study design

The Trøndelag Health Study (The HUNT Study) is a cohort health study carried out in the Norwegian county of Trøndelag. The study was conducted in four waves of data gathering so far, and the current study will use information from the HUNT4 Survey 2017-2019(refer to Appendix A, Appendix B) (Åsvold et al., 2021). Questionnaires, interviews, clinical examinations, and biological samples are all part of the HUNT Study. Questions on socioeconomic conditions, health-related habits, symptoms, illnesses, and diseases are included in the surveys (Krokstad et al., 2013). The HUNT Research Centre is split into two parts: a biological repository and a database with over 5,500 variables. A total of 56,044 inhabitants from Nord-Trøndelag County participated in HUNT4. Several additional sub-projects were implemented in connection with HUNT4, most notably the arthritis study (Kvenild, 2015). The current study is a cross-sectional study.

Participants

A total number of 4669 participants who took measurements during HUNT4 at field station and confirmed RA, or spondylarthritis, or both joint pains last 6 months and psoriasis on question number 7 of Appendix A. In addition, a random 5% selection of measurement participants who reported on joint pains last 6 months, but not confirming psoriasis, were given the questionnaire.

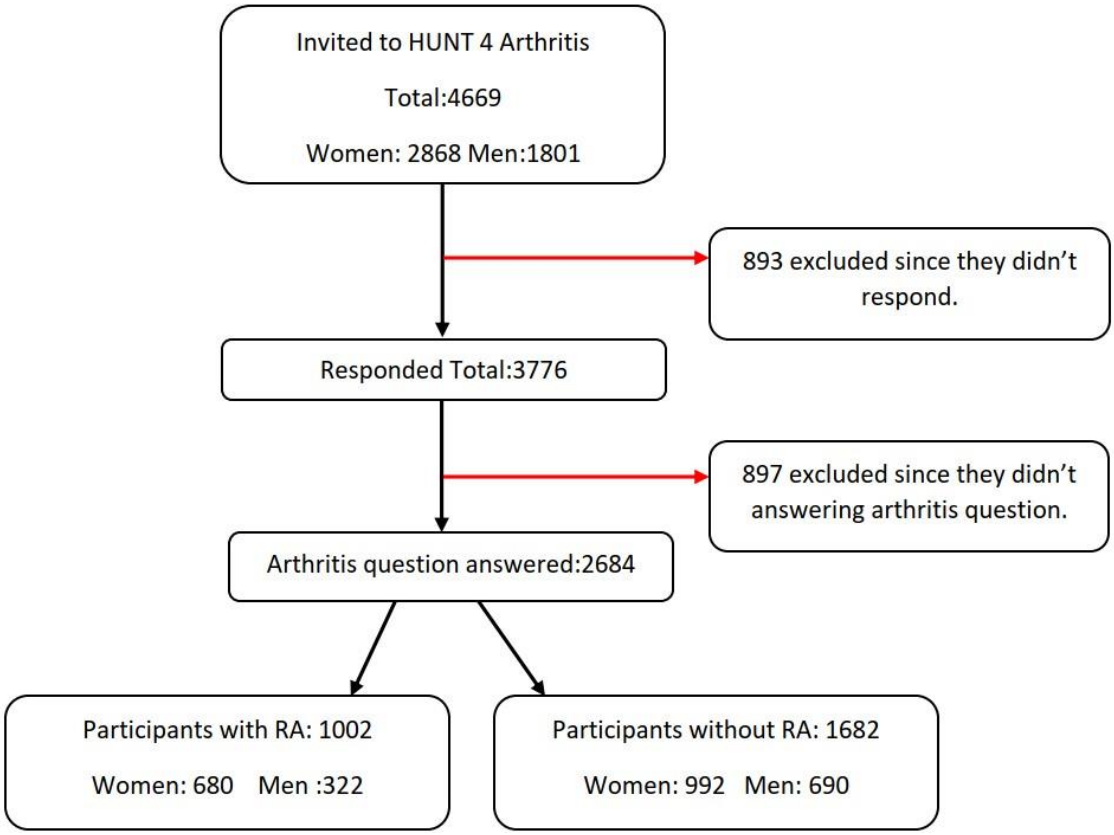

Figure 2 Flow diagram of the selection of participants (inclusion, exclusion, and the number of participants) in the Hunt 4 arthritis sub-study.

Of these, 3776 responses came back with an age range of 19 to 97 years old. Participants were excluded from the current study if they did not answer the arthritis questionnaire. A total of 2684 participants responded to the invitation and filled out the arthritis questionnaire and were included in the final analyses (Figure 2). To conduct the current study, participants were divided into RA group (participants with RA) and reference group (participants without RA).

Data analysis and variables

RA as exposure variable

The HUNT4 Arthritis Questionnaire which can be found in Appendix B, consists of a wide span of questions in relation to when RA and joint pain were diagnosed by a physician, injuries and operations, intensity of the disorder, and family history predisposition. Directed acyclic graph (DAG) of associations between RA as exposure, ADL as outcome variable, and

confounders are shown in Figure 3.In this study, the existence of other chronic diseases in family members and siblings is considered as a root to the exposure.

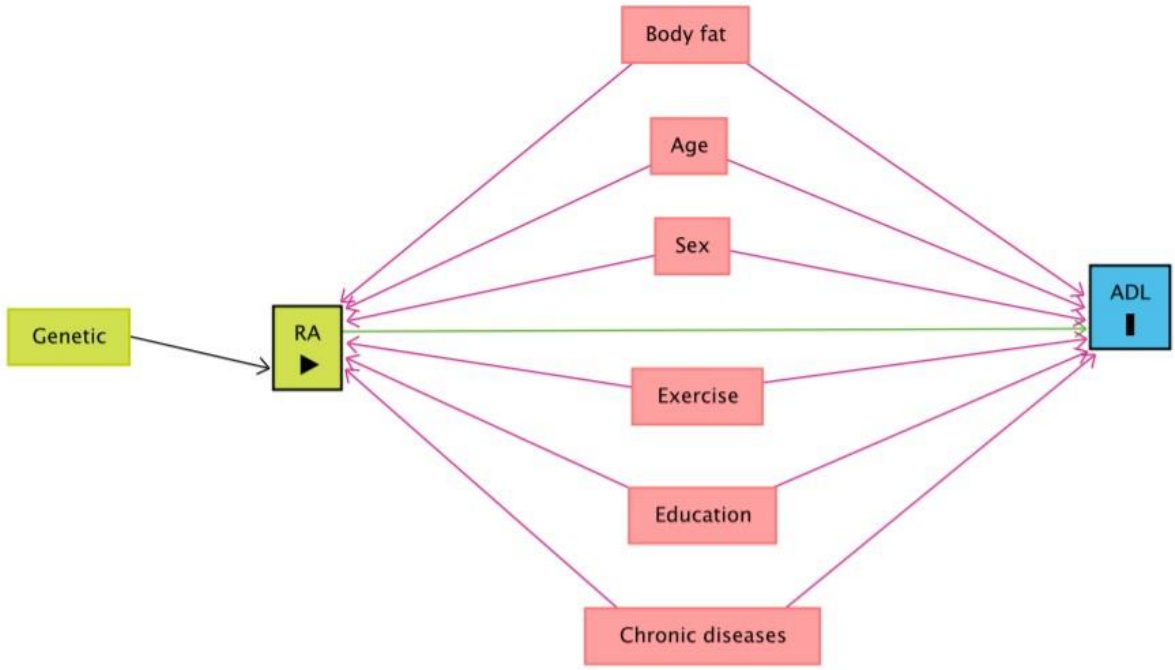

Figure 3 Directed acyclic graph (DAG) associations between exposure (RA), outcome (ADL) and covariates (red boxes).

The relevant question about family history in the questionnaire as shown in question number 5 of Appendix B "Do you have parents, siblings or children who have, or have had, the following diseases?". Alternative answers were diverse in physical and mental aspects.

ADL as outcome variable

The DAG in Figure 1 shows the causal path between RA and ADL, which consists of several potential confounders. ADLs and IADLs are divided into four dimensions. The first dimension is intense ADL activities that heavy responsibilities have to be handled. A second dimension contained basic IADLs like getting in/out of a car. The third dimension included basic ADL like personal hygiene, drinking or dressing. A fourth dimension was labelled hand-focused ADLs included activity in which the hand and fingers are used (Stamm, 2016). ADLs and IADLs which are assessed in this study are some of all necessary activities to be able to live independently in the society for everyone (Table 1). We used logistic regression analyses to study risk factors for having the different ADL/IADL problems

Table 1 ADLs and IADLs dimensions (Stamm, 2016)

	Dimension 1	**Dimension 2**	**Dimension 3**	**Dimension 4**
Title	**Intense ADL**	**Basic IADL**	**Basic ADLs**	**Hand-focused ADL**
Component	Bending	Getting in/out of a car	Wearing clothes Get in/out of bed Take a bath or shower Lift a glass and drink	Opening a jar
Description	Heavy burden has to be handled	Necessary to live independently	Basic self-care tasks	Hands or fingers are used that focus on shaking and turning.

The relevant question about ADL/IADL in the questionnaire as shown in question number 9 of Appendix B "How has your physical function been the last week??". Alternative answers are shown in Table 2.

Table 2 ADL question, alternatives, and scoring system.

How has your physical function been the last week?		**Score**
No problems	Can handle without problems	**0**
	Can handle with some problems	
Big problems	Copes with major problems	**1**
	Cannot handle	

Confounders

Participant characteristics such as age, sex, chronic diseases, Family history, body fat (%), and exercise score were acquired from the questionnaires. Socioeconomic status was assessed by level of education. Family history variable is describing the participants. Potential confounders for checking the association in this study are age, sex, chronic diseases, body fat (%), education, and exercise score. Body fat (%) was retrieved from body composition`s result at HUNT field station.

The relevant Education level question as shown in question number 45 of Appendix A was "Which education is the highest you have completed?". The scoring system in Table 3 shows the different answer categories along with their assigned scores.

Table 3 Education question, answer alternatives, and scoring system.

Which education is the highest you have completed?	**Score**
9-10 years compulsory primary and lower secondary school	**1**
One or two years of academic or vocational school	**2**
3 years of academic or vocational school	**3**
3-4 years vocational school/apprentice (upper secondary/sixth form college)	**4**
College or university, less than four years	**5**
College or university, four years or more	**6**

Exercise is a potential confounder and was assessed by adding these three dimensions of exercise, namely duration, frequency, and intensity. The relevant exercise questions in HUNT4 study as shown in question numbers 28-30 of Appendix A were "How often do you exercise?", "How hard do you exercise?", "How long do you last each time?" In the questionnaire, exercise was defined as hiking, skiing, biking, swimming, or doing training / sports. A scoring system was used for each question to combine all three variables into a single overall exercise score. Assigned scores to each answer are shown in Table 4. If the answer to any of these questions was missing, its score was set to 0. For each subject, the total score was calculated by adding participants' scores together from duration, frequency, and intensity of exercise (Kurtze, 2008). Missing values were set to 0. Thus, the range in score of the combined exercise variable is from 0 to 12.

Table 4 Exercise questions, answer alternatives, and scoring system.

How hard do you exercise?			**Score**
Take it easy without getting out of breath or sweating			**1**
Takes it so hard that I get out of breath or sweat			**2**
Takes me completely out			**3**
How often do you exercise?	**Score**	**How long do you last each time?**	**Score**
Never	**1**	Less than 15 minutes	**1**
Less than once a week	**2**	15-29 minutes	**2**
Once a week	**3**	30-60 minutes	**3**
2-3 times a week	**4**	More than 60 minutes	**4**
Every day	**5**		

The relevant chronic diseases question as shown in question number 2 of Appendix A was "Do you now have any long-term (at least 1 year) illness, injury or suffering of a physical or mental nature which impair your functions in your daily life?". Alternative answers were yes or no.

Ethics

The HUNT study is license as registered data. HUNT 4 data collection`s license number is 17/ 00426-7/ GRA. This master project was conducted after the approval of the regional committee for medical and health research ethics (REK) with reference number 185950. The process of data collection started with obtaining informed consent from participants. Participation was voluntary and they had the right to stop their engagement without providing any reasons. Collected data is stored in a closed data solution without internet connection for safety against hacking. Personal data and identification keys are not visible nor accessible by researchers. Vital data to conduct the current study was stored temporarily on NTNU's password-protected servers and will be deleted at the end of the project period.

Statistical analysis

Main characteristics were presented in the analysis dataset (n=2684). In the descriptive analysis, the confounders were provided as percentages for categorical variables and as mean and standard deviation for continuous variables. T-test for continuous variables and Pearson's

chi-square test for categorical covariates were used to analyze group differences between participants with and without RA. The association between RA and ADL was investigated using logistic regression models, where we report odds ratios (OR) and corresponding 95% confidence intervals (CI). We fitted two sets of models. The first set consisted of crude models where we included RA only as an independent variable. We also fitted adjusted models in which we adjusted for potential confounders such as age, sex, body fat (%), education, exercise, and chronic diseases. The participants who reported not to have RA were used as reference group in the analyses and the OR are interpreted as the odds for big ADL-problems for participants with RA compared to those without RA (reference group). Statistical significance was set at p-values less than 0.05. Prevalence is the number of participants with RA divided by the total population. Risk (%) was calculated for each ADL/IADL as the number of participants with big problems by the total population. STATA version 16.0 was used for all data analysis.

RESULTS

In total 2684 participants were included in the current study. Their age ranged from 19 to 97 years old, with a mean age of 60.11±14.35 years. There were more female participants than male participants (62.30% versus 37.70% $p < 0.001$). The baseline descriptive statistics of the participants are shown in Table 5. As can be seen in Table 5, participants with RA are older on average (with a mean age of 64.23±13.78 years) than the participants without RA (with a mean age of 57.65±14.13 years). The difference in mean age between the two groups with corresponding 95% CI was 6.58 years (95% -7.673 to -5.496, $p<0.001$). Body fat percentage was slightly higher in participants with RA compared to reference group (35.36±8.89 versus 33.47±9.32), the mean difference was 1.89 (95% -2.623 to -1.159, $p<0.001$). Participants without RA had higher education (mean 3.72±1.63) than the patients with RA (mean was 3.36±1.67), the difference was 0.36 (95% 0.231 to 0. 491, $p<0.001$). Exercise scores in patients with RA are lower (7.12±3.01) than the reference group (7.36±2.99), difference in mean score was 0.24 (95% 0.002 to 0. 472, $p = 0.048$). There were more female participants, 1672(62.30%) compared to male participants 1012 (37.70%), ($p<0.001$). Furthermore, more participants within RA group reported having other chronic diseases than the reference group (83.43% versus 67.59%), ($p<0.001$). More participants have family history of RA in the RA group than those in the reference group (46.0% versus 25.3%). ($p<0.001$). Regarding the use of heritage, based on the DAG (Figure 3), because family history is not a confounder, and this variable is therefore not included in the further analysis.

Table 5 Descriptive statistics of characteristics of participants with and without RA in the current study. P-value refers to Pearson chi square and t-test.

		Rheumatoid arthritis (RA)		
Characteristics	**Overall** 2684	**With RA** 1002(37.33%)	**Without RA** 1682(62.66%)	**P-value***
Continuous variables				
Age (Years)	60.11±14.35	64.23±13.78	57.65±14.13	<0.001
Body fat (%)	34.17±9.21	35.36±8.89	33.47±9.32	<0.001
Education	3.58±1.65	3.36±1.67	3.72±1.63	<0.001
Exercise score	7.27±3.00	7.12±3.01	7.36±2.99	0.048
Categorical variables				
Sex				<0.001
Female	1672(62.30%)	680(67.86%)	992(58.97%)	
Male	1012 (37.70%)	322(32.13%)	690(41.02%)	
Chronic diseases				<0.001
Yes	1973(72.16%)	836(83.43 %)	1137(67.59%)	
No	692(25.78%)	155(15.46 %)	537(31.92%)	
Unknown	19(0.71%)	11(1.09 %)	8(0.47 %)	
Heritage				<0.001
Yes	886(33.01%)	461(46.01%)	425(25.26 %)	
No	1680(62.59%)	491(49%)	1189(70.68%)	
Unknown	118(4.39%)	50(4.10 %)	68(4.04%)	

Data are presented as number of participants (column percentage) or mean ± standard deviation. *Comparisons between confounders and participants with and without RA; p-values reported using Pearson chi square tests for categorical variables or t-test for continuous variables.

The adjusted model with the confounders age, sex, education, exercise, body fat (%), and chronic diseases (Table 6 and Figure 4) showed that bed, open jar, car, and bend remained significantly associated with RA. The IADL activity walk outdoors changed from a significant association in the crude model to insignificant in the adjusted model, which indicates that one or more of the confounding variables can explain the association between RA and walk outdoors in the crude model. However, the IADL factor car remained significant in both the crude and the adjusted model, which indicates that the confounding variables cannot explain the association between RA and walk outdoors in the adjusted model.

Table 6 Results from crude and adjusted model for the association between RA and ADL in adults.

ADL & IADL	N	Big problems	Risk (%)	Crude		Adjusted	
				OR (95%CI)	P-value	OR (95%CI)	P-value
Dress	2625	49	1.87%	1.55 (1.05 – 2.31)	0.028	1.31 (0.82 – 2.07)	0.245
Bed	2626	26	0.99%	1.92 (1.09 – 3.40)	0.023	2.63(1.35 – 5.15)	0.004
Drink	2622	16	0.61%	3.41 (1.45 – 8.01)	0.005	2.23 (0.91 – 5.50)	0.079
Wash	2626	35	1.33%	1.93 (1.18 – 3.15)	0.008	1.51 (0.84 – 2.72)	0.164
Open jar	2631	238	0.90%	2.08 (1.69– 2.55)	<0.001	1.49 (1.18– 1.89)	0.001
Bend	2628	90	3.42%	1.56 (1.16 – 2.11)	0.003	1.41 (1.01– 1.98)	0.045
Car	2628	62	2.35%	2.03 (1.39– 2.96)	<0.001	1.58 (1.03– 2.43)	0.035
Walk outside	2622	35	1.33%	2.51 (1.48– 4.24)	0.001	1.58 (0.82 – 3.04)	0.170

P-value significance less than 0.05. Adjusted for age, sex, education, exercise, chronic diseases, body fat (%).

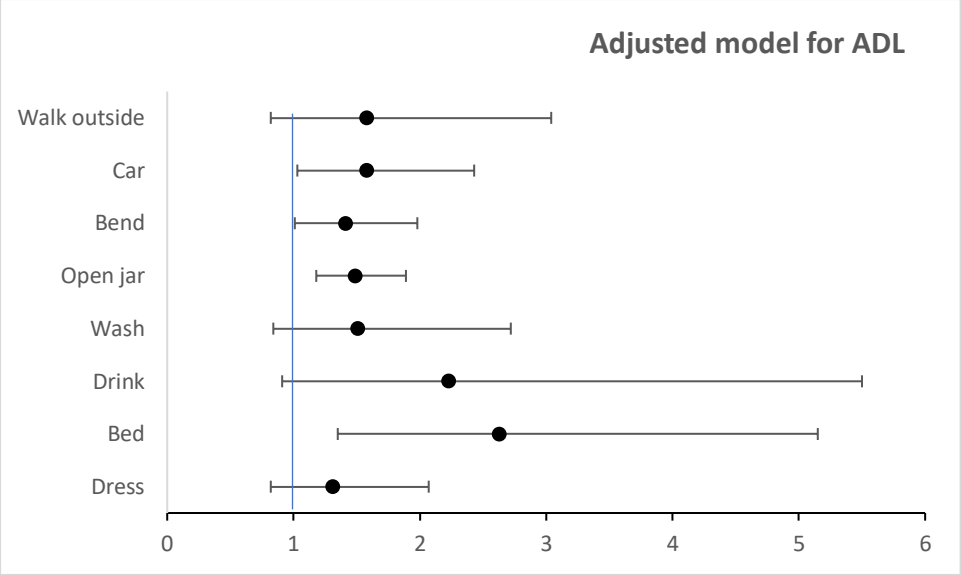

Figure 4 Forest plot for adjusted model in ADL & IADL.

We were also interested in gender differences in the association between RA and the different ADL/IADLs. Table 7 shows the association following adjusted logistic regression analysis for each gender. We fitted only adjusted models.

We observed differences between the two genders (Table 7 and Figure 5). Not all ADL/IADLs were significantly associated for both males and females. Getting in/out of a car was significantly associated for men whereas getting in/out of bed and opening a jar were significantly associated for females. Dress, bed, drink, wash, bend, and walk outside were not significantly associated for either gender. In general, it looked as if RA decreased women's ADL more than men (two significant associations for women compared to 1 significant association for men).

Table 7 Adjusted model for the association between RA and ADL in adults for both genders.

ADL & IADL	Adjusted							
	Female with RA (N=680)				Male with RA (N=322)			
	Big problems	Risk (%)	OR (95%CI)	P-value	Big problems	Risk (%)	OR (95%CI)	P-value
Dress	35	5.14%	1.44 (0.96 – 2.63)	0.233	14	4.34%	1.17(0.79–2.40)	0.671
Bed	19	2.79%	2.46 (1.07–5.68)	0.034	7	2.17%	2.91 (0.88–9.61)	0.079
Drink	12	1.76%	2.16 (0.76–6.10)	0.144	4	1.24%	3.43 (0.49 – 23.86)	0.213
Wash	27	3.97%	2.05 (0. 92– 4.54)	0.075	8	2.48%	1.01 (0.39–2.55)	0.986
Open jar	216	31.76%	1.50(1.16–1.93)	0.002	22	6.83%	1.58 (0.84–3.00)	0.154
Bend	51	7.5%	1.37 (0.85–2.20)	0.186	39	12.11%	1.47(0.90–2.38)	0.120
Car	47	6.91%	1.37 (0. 83– 2.27)	0.211	15	4.65%	2.53 (1.08–5.93)	0.033
Walk outside	32	4.70%	1.87(0.90–3.90)	0.091	3	0.93%	0.66(0.12–3.57)	0.634

P-value significance less than 0.05. Adjusted for age, education, exercise, chronic diseases, body fat (%).

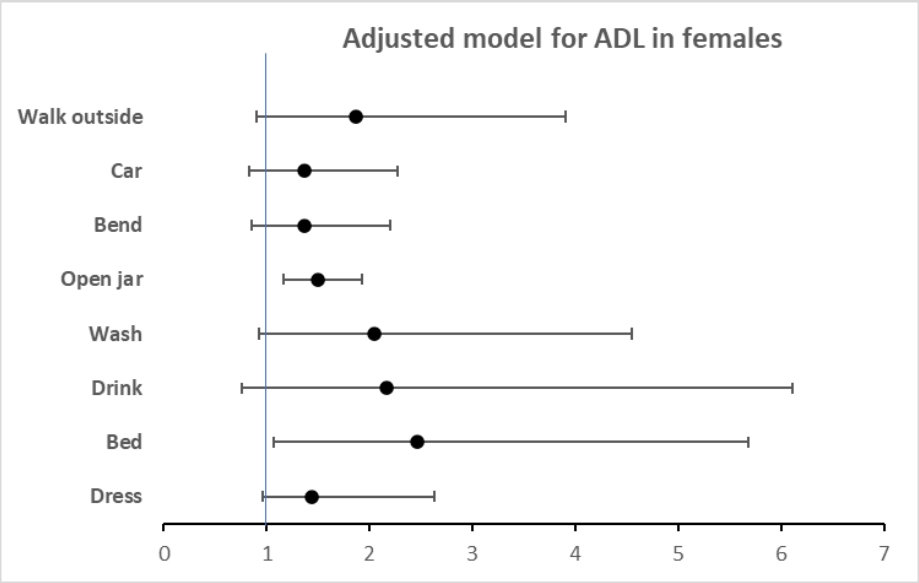

Figure 5 Forest plot for adjusted model for ADL in female participants.

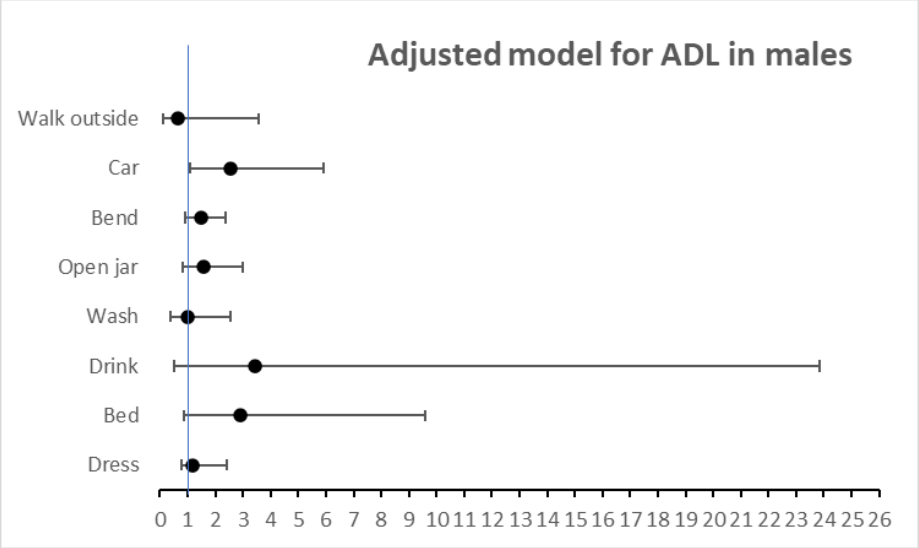

Figure 6 Forest plot for adjusted model for ADL in male participants.

The RA estimated prevalence was 37.33% in the arthritis sub-group in HUNT4 study 1.7%. Furthermore, prevalence estimated for females with RA were higher than for male participants with RA both in the arthritis subgroup (40.7% versus 31.8%) and HUNT4 study (1.21% versus 0.57%).

DISCUSSION

The purpose of this cross-sectional population-based study was to investigate the association between ADLs / IADLs and RA in adults, based on HUNT4 data, and to explore potential differences between males and females. The findings from this study indicate that there is a significant relationship between RA and ADL, as well as differences between the two genders. Females with RA have 8.9% higher prevalence more than males. Females with RA have problems with opening jar and getting in/out of bed, whereas getting in/out of car is harder to do for male patients with RA.

RA and potential confounders made it harder to operate ADLs and IADL; going in/ out of bed, opening a jar, bending to pick up a thing, and getting in/out of a car. The risk (%) for each ADL/IADL based on the number of participants with big problems are descending from highest to lowest risk as follows: bending to pick up something, getting in/out of a car, wearing clothes, hygiene and walking outdoors, going in/ out of bed, opening jar, and picking up a glass to drink (see Table 6). When comparing for each gender, women with RA have problems getting in/out of bed and opening a jar (see Figure 5). Men with RA only have problem in order to get in/out of a car (see Figure 6). The ADLs opening a jar and bending to pick up something are hindered by RA for both genders. Lack of prior studies regarding the association between RA and different ADLs/IADLs makes it difficult to compare results of this study with previous studies. Stamm et al. (2016) demonstrated that female sex was associated with an increased risk of deficits in intense ADLs, but with a decreased risk of deficits in basic IADLs. Age was associated with an increased risk of reduction in all four dimensions of ADL. Prevalence of RA in in HUNT4 study 1.7%. Women`s prevalence in the HUNT4 study is 2.12 times more than men. According to Almutairi et al.2021, the global RA prevalence estimate was 0.46% (95% 0.39-0.54). Linauskas et al., 2019, stated that being female contribute to higher risk for RA. The results were similar to previous studies.

Family history of RA is a function of both genetic and environmental risk of developing RA. The results suggest that having RA in the family history might contribute to developing RA. Based on the findings of Frisellet al. (2016), family history seems one of the strongest risk factors for developing RA. Despite the progress made in family history association studies, this predictive value is unlikely to be replaced by genetic markers any time soon. It can be argued that participants mean age was in adult age group which is 25-64 years. However, participant with RA were part of senior group that is more than 65 years old. Elderly people are more often

diagnosed with RA. According to Onna et al. (2016), age- related decline in immune cell functions, may contribute to the development of RA. This is a similar finding to previous study. The results on sex as a potential confounder indicated that RA`s prevalence is higher in women compared to men. Sokka et al. (2009) published an analysis based on an exceptionally large international cohort of RA patients. Their results indicated that in this large multinational cohort, RA disease development measures are worse in women than in men. Physiological changes may help to decrease risk of RA in women. According to Chen et al. (2015), the result from their meta-analysis suggests that breastfeeding is associated with a lower risk of RA, no matter if breastfeeding time is longer or shorter than 12 months.

The majority of participants reported both RA and other chronic diseases, with a minority of participants who only have RA. Consequently, based on the present results, there is a significant association between having other chronic diseases and RA. Similarly, Jeong et al. (2017) stated that RA was associated with an increased risk of cardiovascular disease, pulmonary tuberculosis, asthma, thyroid disease, hepatitis B, and depression after adjustment of socioeconomic and lifestyle characteristics. Participants with RA have higher BMI/body fat % than those without RA. As a result, higher body fat (%) is associated with increased risk of having RA. This is consistent with Qin et al. (2015), whose results suggested that an increase in BMI could contribute to higher risk for RA.

Participants` education level overall is higher than 3 years of academic or vocational school. However, non-RA participants have higher level of education than RA patients in the current study. This is a similar finding of previous studies. For example, Jiang et al. (2015) found that higher educated newly diagnosed RA patients had less pain and less functional impairment at diagnosis and throughout the follow-up period, although the statistically significant differences were of limited clinical relevance. Exercise scores show that RA patients are less active, and they have reported lower scores. It is likely that RA`s symptoms such as stiffness, inflammation, pain, and fatigue in RA patients make exercising more difficult compared to non-RA participants. This is a similar result of previous studies. Conn et al. (2008) conducted a meta-analysis on outcomes for exercise intervention among adults with RA. Their findings showed that exercise interventions resulted in moderate positive effects on physical activity behavior and small positive effects on pain and physical function outcomes. They suggested that future research should further examine frequency, type, and intensity of exercise. Analyzing confounders such as exercise, education level, and ADL/IADL by assigning score for each response of participants have both advantage and disadvantages. The most important

advantage of using similar scoring system is to include missing values to consider as many participants as possible in the analysis. However, a wide range of scores will be produced to interpret. There is another way of analyzing exercise confounder which is Mets. Mets system can be applied if more information in details were provided.

More research is still required to find out whether other ADLs/IADLs can be hindered by RA generally and between genders. All patients with RA who have had it for a long time are on medicines to keep it under control. However, this does not lessen the significance of nonpharmacologic (non-drug) therapies. Effective treatments consist of education and counseling, rest, exercise, physical and occupational therapies, dietary therapy, measures to reduce bone loss, as well as avoiding smoking and consuming alcohol (Venables, 2022). Improved awareness about the potential relationship between RA and ADL is important to better plan, develop, and improve the health services of the future.

Strengths

To the best of our knowledge, this cross-sectional study is the first to use a large study sample (n=2684 from the HUNT4 study) to investigate the association between RA and daily life functioning in adults. A wide range of sociodemographic and lifestyle variables are available in the questionnaire data, allowing for the ability to include potential key factors in the analysis, thereby enhancing the validity of the results. The current study highlights the prevalence of RA and its impact on Norwegians, which may be relevant for similar countries and participants.

Limitations

There are several limitations associated with this study as well. Missing data on characteristics were classified as "unknown", which could lead to residual confusion. ADL-related information was evaluated based on self-reports rather than standard measurement methods by healthcare professionals, which potentially may have led to bias in the information given by the participants. Moreover, we did not have equal sample sizes between men and female participants, which may also skew the results.

Key confounders which may have an impact on the association between RA and ADL are many. The geographic area in which HUNT4 study was conducted may put some restrictions on the results, as it does not include any major cities. In the current study, due to timing and researchers' choices, smoking was not considered, but as chronic diseases and smoking are

some of the most important confounding factors, medical researchers need to analyze these in more detail. Finally, the current study is cross-sectional, which takes into consideration the recognizable proof of associated factors. However, this does not allow to ascertain a cause-and-effect relationship. For this, a longitudinal design would be necessary, the data of which are available in the HUNT dataset.

CONCLUSION

In summary, the results of this research indicate that there is a significant association between RA and ADL in Norwegian people, based on the HUNT4 dataset. Women are more at risk of RA than men and have more problems with ADL/IADL. The lack of studies about the association between RA and different ADLs and IADLs highlights the importance of such studies as the current one. Furthermore, gender differences in the association between RA and ADL/IADL is not sufficiently studied. This is one of the first studies to show an association between RA and ADL/IADL in greater detail. In the future, more studies regarding RA and ADL would contribute to understand better and reduce the prevalence of RA.

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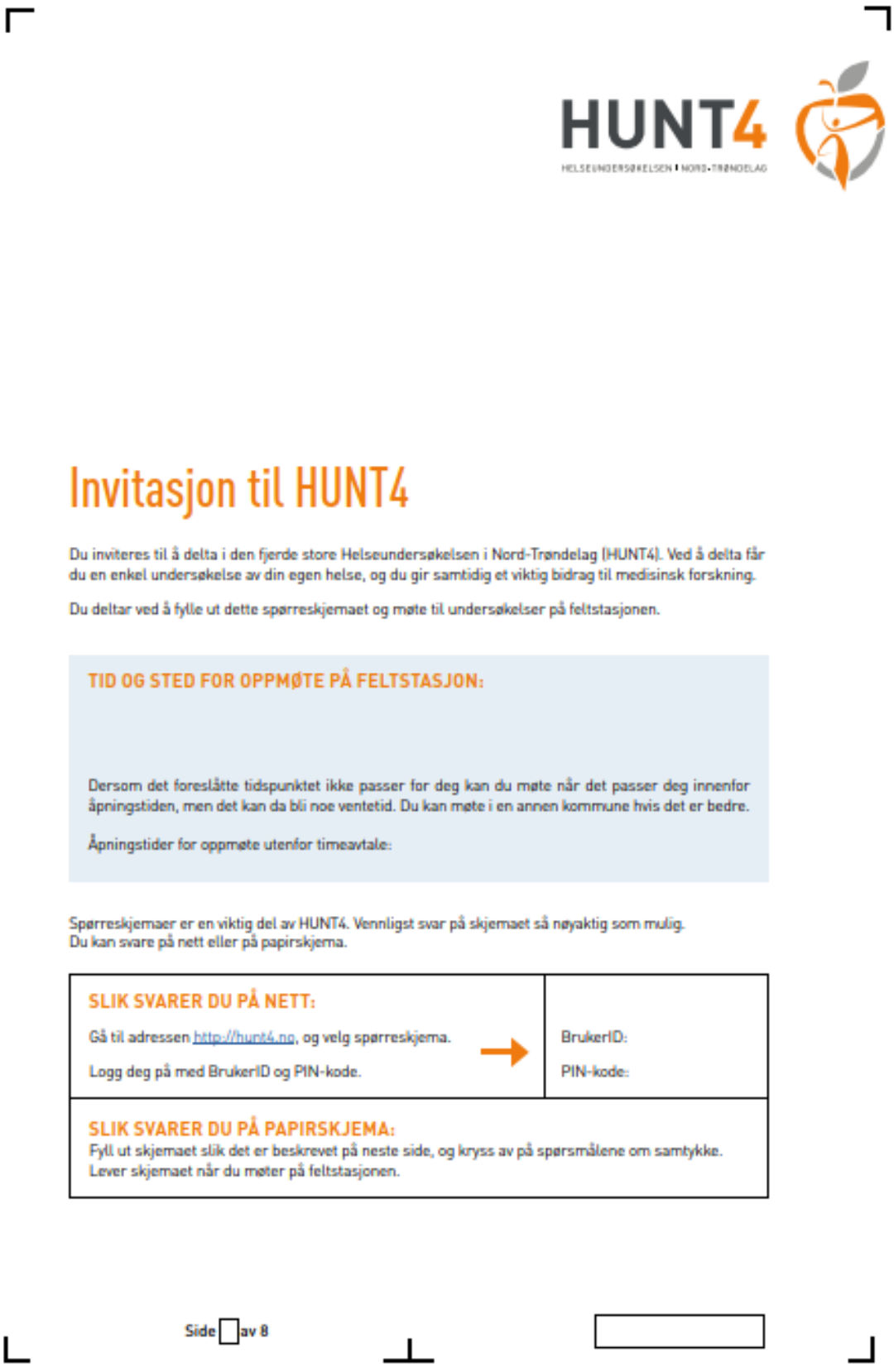
APPENDIXES

Appendix A Invitation to HUNT 4 (nt4blq11)



HUNT4

HELSEUNDERSØKELSEN I NORD-TRØNDELAG

Invitasjon til HUNT4

Du inviteres til å delta i den fjerde store Helseundersøkelsen i Nord-Trøndelag (HUNT4). Ved å delta får du en enkel undersøkelse av din egen helse, og du gir samtidig et viktig bidrag til medisinsk forskning.

Du deltar ved å fylle ut dette spørreskjemaet og møte til undersøkelser på feltstasjonen.

TID OG STED FOR OPPMØTE PÅ FELTSTASJON:

Dersom det foreslåtte tidspunktet ikke passer for deg kan du møte når det passer deg innenfor åpningstiden, men det kan da bli noe ventetid. Du kan møte i en annen kommune hvis det er bedre.

Åpningstider for oppmøte utenfor timeavtale:

Spørreskjemaer er en viktig del av HUNT4. Vennligst svar på skjemaet så nøyaktig som mulig.
Du kan svare på nett eller på papirskjema.

SLIK SVARER DU PÅ NETT: Gå til adressen http://hunt4.no, og velg spørreskjema. Logg deg på med BrukerID og PIN-kode.	BrukerID: PIN-kode:
SLIK SVARER DU PÅ PAPIRSKJEMA: Fyll ut skjemaet slik det er beskrevet på neste side, og kryss av på spørsmålene om samtykke. Lever skjemaet når du møter på feltstasjonen.	

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Du kan lese mer om HUNT4 i den vedlagte informasjonsbrosjyren eller på http://hunt4.no.
Om noe er uklart kan du kontakte HUNT forskningssenter på telefon 74 07 51 80 eller på e-post hunt@medisin.ntnu.no.

Vel møtt til undersøkelsen!

Med vennlig hilsen

Steinar Krokstad
Daglig leder, HUNT

Björn Gustafsson
Dekan, Fakultet for medisin og helsevitenskap

I spørreskjemaet finner du spørsmål om plager og sykdommer og om andre forhold som har betydning for helsa. Dersom enkelte spørsmål er uklare, lar du dem bare stå ubesvarte. Hvis du vil, kan du drøfte dem med personalet på feltstasjonen. Flere steder i skjemaet ber vi om antall ganger noe har skjedd, eller alder første gang noe skjedde. Hvis du ikke husker nøyaktig, kan du skrive det tallet du tror er mest riktig.

Hver deltaker er like viktig, enten du er ung eller gammel, frisk eller syk, er HUNT-veteran eller møter for første gang. Jo flere som blir med, jo mer helhetlig og verdifull blir HUNT. Din deltakelse bidrar til at vi kan finne ut mer om hva som påvirker helse og livskvalitet for alle grupper i samfunnet. For å kunne studere årsaker til, og utvikling av sykdom, er det viktig at også de som tidligere har deltatt møter fram.

LES DETTE FØR DU STARTER

Skjemaet skal leses maskinelt. Følg derfor disse instruksjonene:

- Bruk svart/blå kulepenn eller en god blyant.
- Kryss av slik: ☒
- Krysser du feil, fyller du hele feltet med farge, slik: ■ Sett så kryss i rett felt.
- Sett bare ett kryss for hvert spørsmål om ikke annet er oppgitt.
- Bruk hele tall når du fyller inn antall år eller antall ganger, slik: 5 2

SAMTYKKE TIL HUNT4

Jeg har lest informasjonsbrosjyren om HUNT4 og er kjent med hva det generelle samtykket til å delta innebærer. Jeg har hatt anledning til å spørre om mer informasjon.

Samtykker du til å delta i HUNT4?

☐ Ja, jeg samtykker til å delta i HUNT4

Du kan delta i HUNT4 uansett om du svarer ja eller nei på valgene under.

SPESIFIKKE SAMTYKKER FOR GENETISKE ANALYSER

Nærmere informasjon om dette finner du på side 7 i informasjonsbrosjyren for HUNT4.

Hvis genetiske analyser avdekker økt risiko for sykdom, ønsker du tilbakemelding om slik økt risiko?

Ja ☐ Nei ☐

Ønsker du å bli invitert til oppfølgingsstudier basert på genetiske funn, inkludert varianter som kan gi økt risiko for sykdom?

Ja ☐ Nei ☐

HELSE OG DAGLIGLIV

1 Hvordan er helsa di nå?

Dårlig ☐ Ikke helt god ☐ God ☐ Svært god ☐

2 Har du nå noen langvarig (minst 1 år) sykdom, skade eller lidelse av fysisk eller psykisk art som nedsetter dine funksjoner i ditt daglige liv?

Nei ☐ Ja ☐

HVIS JA:
Hvor mye vil du si at dine funksjoner er nedsatt?
(Sett ett kryss per linje)

	Ikke nedsatt	Litt nedsatt	Middels nedsatt	Mye nedsatt
Er bevegelseshemmet	☐	☐	☐	☐
Har nedsatt syn	☐	☐	☐	☐
Har nedsatt hørsel	☐	☐	☐	☐
Hemmet pga. kroppslig sykdom	☐	☐	☐	☐
Hemmet pga. psykisk sykdom	☐	☐	☐	☐

3 Hvor sterke kroppslige smerter har du hatt i løpet av de siste 4 uker?

Ingen ☐ Meget svake ☐ Svake ☐ Moderate ☐ Sterke ☐ Meget sterke ☐

4 I hvilken grad har din fysiske helse eller følelsesmessige problemer begrenset deg i din vanlige sosiale omgang med familie eller venner i løpet av de siste 4 uker?

Ikke i det hele tatt ☐ En del ☐ Litt ☐ Mye ☐ Kunne ikke ha sosial omgang ☐

5 Har du de siste 2 ukene følt deg:
(Sett ett kryss per linje)

	Nei	Litt	En god del	Svært mye
Trygg og rolig	☐	☐	☐	☐
Glad og optimistisk	☐	☐	☐	☐
Nervøs og urolig	☐	☐	☐	☐
Plaget av angst	☐	☐	☐	☐
Irritabel	☐	☐	☐	☐
Nedfor/deprimert	☐	☐	☐	☐
Ensom	☐	☐	☐	☐
Generelt anspent	☐	☐	☐	☐

6 Føler du deg stort sett sterk og opplagt, eller trøtt og sliten?

Meget sterk og opplagt	☐
Sterk og opplagt	☐
Ganske sterk og opplagt	☐
Både- og	☐
Ganske trøtt og sliten	☐
Trøtt og sliten	☐
Svært trøtt og sliten	☐

SYKDOMMER OG PLAGER

7 Har du, eller har du noen gang hatt, noen av følgende sykdommer/plager? Angi også alder da du fikk dette/disse. *(Sett ett kryss per linje)*

	Nei	Ja	Alder første gang?
Angina	☐	☐	☐☐ år gammel
Hjerteinfarkt	☐	☐	☐☐ år gammel
Hjertesvikt	☐	☐	☐☐ år gammel
Atrieflimmer (forkammerflimmer)	☐	☐	☐☐ år gammel
Hjerneslag (hjerneinfarkt eller blødning)	☐	☐	☐☐ år gammel
Astma	☐	☐	☐☐ år gammel
Kols eller emfysem	☐	☐	☐☐ år gammel
Diabetes (sukkersyke)	☐	☐	☐☐ år gammel
Lavt stoffskifte (hypotyreose)	☐	☐	☐☐ år gammel
Høyt stoffskifte (hypertyreose)	☐	☐	☐☐ år gammel
Kreftsykdom	☐	☐	☐☐ år gammel
Migrene	☐	☐	☐☐ år gammel
Psoriasis	☐	☐	☐☐ år gammel
Nyresykdom, utenom urinveisinfeksjon	☐	☐	☐☐ år gammel
Leddgikt (reumatoid artritt)	☐	☐	☐☐ år gammel
Bechterews sykdom (spondylartritt)	☐	☐	☐☐ år gammel
Urinsyregikt (podagra)	☐	☐	☐☐ år gammel
Psykiske plager som du har søkt hjelp for	☐	☐	☐☐ år gammel

Side ☐ av 8

8 **Har du de siste 12 måneder hatt anfall med tung eller pipende pust?** Nei ☐ Ja ☐

9 **Har du de siste 12 måneder hatt smerter i ledd som har vart i mer enn 6 uker?** Nei ☐ Ja ☐

10 **Har du noen gang fått påvist for høyt blodsukker?** Nei ☐ Ja ☐ Alder første gang? ☐☐ år gammel

BRUK AV MEDISINER

11 **Bruker du noen reseptpliktige medisiner nå?**

Nei ☐ Ja ☐

HVIS JA:

Bruker du noen av disse medisinene? Angi også alder da du begynte med slik medisin.

	Nei	Ja	Alder første gang?
Medisin for høyt blodtrykk	☐	☐	☐☐ år gammel
Kolesterolsenkende medisin	☐	☐	☐☐ år gammel
Medisin for astma eller kols	☐	☐	☐☐ år gammel
Medisin for angst eller depresjon	☐	☐	☐☐ år gammel
Medisin for stoffskiftet	☐	☐	☐☐ år gammel
Tabletter eller nesespray mot allergi	☐	☐	☐☐ år gammel

12 **Har du noen gang fått kortisonsprøyte(r)?**

Nei ☐ Ja ☐ Vet ikke ☐

HVIS JA:

Hvorfor har du fått kortisonsprøyte(r)?

(Flere kryss mulig)

Allergi	Sene-betennelse	Leddsmerter	Annet
☐	☐	☐	☐

Hvor mange kortisonsprøyter har du fått siste 12 måneder? ☐☐ Antall

13 **Hvor ofte har du brukt reseptfrie medisiner mot følgende plager i løpet av den siste måneden?**

(Sett ett kryss per linje)

	Sjelden/ aldri	1-3 ganger per uke	4-6 ganger per uke	Daglig
Halsbrann/sure oppstøt	☐	☐	☐	☐
Treg mage	☐	☐	☐	☐
Hodepine	☐	☐	☐	☐
Smerter i muskler og ledd	☐	☐	☐	☐

BRUK AV HELSETJENESTER

14 **Har du i løpet av de siste 12 måneder vært hos:**

	Nei	Ja
Legevakt	☐	☐
Fastlege/allmennlege	☐	☐
Annen lege eller psykolog utenfor sykehus	☐	☐
Konsultasjon uten innleggelse		
- ved psykiatrisk poliklinikk	☐	☐
- ved annen poliklinikk i sykehus	☐	☐
Kommunal psykiatrisk sykepleier	☐	☐
Fysioterapeut/manuell terapeut	☐	☐
Kiropraktor	☐	☐
Naprapat	☐	☐
Akupunktør	☐	☐
Alternativ behandler, homeopat, soneterapeut, håndspåleggер eller annen	☐	☐

15 **Har du vært innlagt på sykehus de siste 12 måneder?** Nei ☐ Ja ☐

16 **Har du vært hos tannlege/tannpleier de siste 24 måneder?** Nei ☐ Ja ☐

SYKDOMMER I FAMILIEN

17 **Har du foreldre, søsken eller barn som har, eller har hatt, følgende sykdommer?**

	Nei	Ja	Vet ikke
Astma	☐	☐	☐
Høysnue/neseallergi	☐	☐	☐
Kronisk bronkitt/emfysem/kols	☐	☐	☐
Angst eller depresjon	☐	☐	☐
Hjerteinfarkt før 60-årsalder	☐	☐	☐
Diabetes (sukkersyke)	☐	☐	☐
Hjerneslag (hjerneinfarkt eller blødning) før 60-årsalder	☐	☐	☐
Kreft	☐	☐	☐

18 **Har noen av dine besteforeldre, dine foreldres søsken eller dine søskenbarn hatt diabetes?** Nei ☐ Ja ☐ Vet ikke ☐

TOBAKK

19 Røykevaner *(Sett ett kryss)*

- ☐ Jeg har aldri røykt
- ☐ Jeg har røykt AV OG TIL tidligere
- ☐ Jeg røyker AV OG TIL nå (ikke daglig)
- ☐ Jeg røyker DAGLIG nå:
  - Jeg røyker omtrent ..... ☐☐ sigaretter per dag
  - Jeg begynte å røyke daglig da jeg var ..... ☐☐ år gammel
- ☐ Jeg har røykt DAGLIG tidligere:
  - Jeg begynte da jeg var ..... ☐☐ år gammel
  - Jeg sluttet da jeg var ..... ☐☐ år gammel
  - Da jeg røykte, røykte jeg ..... ☐☐ sigaretter per dag

SNUS

20 Snusbruk *(Sett ett kryss)*

- ☐ Jeg har aldri brukt snus
- ☐ Jeg har brukt snus AV OG TIL tidligere
- ☐ Jeg snuser AV OG TIL nå (ikke daglig)
- ☐ Jeg snuser DAGLIG nå:
  - Jeg bruker omtrent ..... ☐☐ esker per måned
  - Jeg begynte å snuse da jeg var ..... ☐☐ år gammel
- ☐ Jeg har tidligere brukt snus DAGLIG:
  - Jeg begynte å snuse da jeg var ..... ☐☐ år gammel
  - Jeg sluttet å snuse da jeg var ..... ☐☐ år gammel

KOSTTILSKUDD

21 Hvor ofte bruker du noen av følgende kosttilskudd? *(Sett ett kryss per linje)*

	Daglig hele året	Daglig kun i vinterhalvåret	Av og til	Aldri
Tran eller omega 3-kapsler	☐	☐	☐	☐
Kalktabletter (kalsium)	☐	☐	☐	☐
Andre vitamin- og/eller mineraltilskudd	☐	☐	☐	☐

MATVARER

22 Tenk på det siste året; hvor mange ganger per uke spiser du disse matvarene? *(Sett ett kryss per linje)*

	Mindre enn 1 gang	1-3 ganger	4-6 ganger	7 eller mer
Frukt/bær	☐	☐	☐	☐
Grønnsaker	☐	☐	☐	☐
Rødt, rent kjøtt (storfe, svin, lam, vilt)	☐	☐	☐	☐
Hvitt, rent kjøtt (kylling, kalkun)	☐	☐	☐	☐
Kjøttdeig, pølser og lignende	☐	☐	☐	☐
Mager, ren fisk (f.eks. torsk, sei)	☐	☐	☐	☐
Fet fisk (f.eks. laks, ørret, sild, makrell som pålegg/middag)	☐	☐	☐	☐

23 Hvor mange glass/beger/kopper drikker/spiser du vanligvis av følgende? *(Sett ett kryss per linje)*

½ liter= 3 glass/beger/kopper	Aldri eller sjelden	1-6 per uke	1 per dag	2-3 per dag	4 eller flere per dag
Helmelk (søt)	☐	☐	☐	☐	☐
Lett/skummet melk	☐	☐	☐	☐	☐
Hel surmelk (kefir, kultur)	☐	☐	☐	☐	☐
Lett/skummet surmelk	☐	☐	☐	☐	☐
Brus/saft med sukker	☐	☐	☐	☐	☐
Brus/saft med kunstig søtning	☐	☐	☐	☐	☐
Smoothie/ fruktjuice	☐	☐	☐	☐	☐
Yoghurt	☐	☐	☐	☐	☐
Kaffe (svart)	☐	☐	☐	☐	☐
Kaffe tilsatt melk/fløte	☐	☐	☐	☐	☐

ALKOHOLBRUK

24 Omtrent hvor ofte har du i løpet av de siste 12 måneder drukket alkohol? *(Regn ikke med lettøl)*

- Ikke drukket alkohol siste 12 måneder ☐
- 1 gang i måneden eller sjeldnere ☐
- 2-4 ganger per måned ☐
- 2-3 ganger per uke ☐
- 4 eller flere ganger per uke ☐
- Jeg har aldri drukket alkohol ☐

25 Hvor mange glass øl, vin eller brennevin drikker du vanligvis i løpet av 2 uker?
(Regn ikke med lettøl, sett 0 hvis du ikke drikker alkohol)

	Øl	Vin	Brennevin
Antall glass	☐☐	☐☐	☐☐

26 Hvor ofte drikker du 6 glass eller mer av øl, vin eller brennevin ved samme anledning?

- Aldri ☐
- Sjeldnere enn månedlig ☐
- Månedlig ☐
- Ukentlig ☐
- Daglig eller nesten daglig ☐

SØVN

27 Hvor ofte har det hendt i løpet av de siste 3 måneder at du:

	Aldri/ sjelden	Av og til	Minst 3 ganger per uke
Snorker høyt og sjenerende	☐	☐	☐
Får pustestopp når du sover	☐	☐	☐
Har vanskelig for å sovne om kvelden	☐	☐	☐
Våkner gjentatte ganger om natta	☐	☐	☐
Våkner for tidlig og får ikke sove igjen	☐	☐	☐
Fungerer dårlig på dagtid (sosialt eller yrkesmessig) pga. søvnproblemer	☐	☐	☐
Får ubehag, kribling eller mauring i bein	☐	☐	☐

Omtrent hvor mange timer nattesøvn får du på en vanlig hverdag? ☐☐ timer

MOSJON/FYSISK AKTIVITET

28 Hvor ofte driver du mosjon? *(Ta et gjennomsnitt)*
Med mosjon mener vi at du f.eks. går tur, går på ski, sykler, svømmer eller driver trening/idrett.

- Aldri ☐
- Sjeldnere enn en gang i uka ☐
- En gang i uka ☐
- 2-3 ganger i uka ☐
- Omtrent hver dag ☐

29 Dersom du driver slik mosjon, så ofte som en eller flere ganger i uka; hvor hardt mosjonerer du? *(Ta et gjennomsnitt)*

- Tar det rolig uten å bli andpusten eller svett ☐
- Tar det så hardt at jeg blir andpusten eller svett ☐
- Tar meg nesten helt ut ☐

30 Hvor lenge holder du på hver gang?
(Ta et gjennomsnitt)

- Mindre enn 15 minutter ☐
- 15-29 minutter ☐
- 30-60 minutter ☐
- Mer enn 60 minutter ☐

31 Omtrent hvor mange timer sitter du i ro på en vanlig hverdag? Regn med både jobb og fritid.
(Ved PC, TV, nettbrett, lesing, bil/buss/togkjøring o.l.)

Antall timer ☐☐

SKJERMBASERT AKTIVITET

32 Anslå hvor lang tid du vanligvis bruker til skjermbaserte aktiviteter per dag i fritiden.
Med skjermbaserte aktiviteter menes PC, nettbrett, smarttelefon, spillkonsoll, TV, lesebrett.

	Ingen tid	Mindre enn 1 time	1-3 timer	4-6 timer	Mer enn 6 timer
Ser på TV/videoer/ annen skjermbasert underholdning	☐	☐	☐	☐	☐
Spiller spill (alene/ med andre)	☐	☐	☐	☐	☐
Kontakter venner eller nettverk	☐	☐	☐	☐	☐
Innhenting av kunnskap/ informasjon	☐	☐	☐	☐	☐
Jobbrelaterte aktiviteter i fritiden	☐	☐	☐	☐	☐

LIVSSTIL

33 Hvor viktig er det for deg å leve sunt?

- Svært viktig ☐
- Viktig ☐
- Lite viktig ☐
- Ikke viktig ☐

34 Hvor fornøyd er du med din egen livsstil (kosthold, mosjon, røyke- og drikkevaner)?

- Svært fornøyd ☐
- Fornøyd ☐
- Lite fornøyd ☐
- Ikke fornøyd ☐

35 Er du fornøyd med vekta di nå?

- Ja ☐
- Nei, altfor tung ☐
- Nei, litt for tung ☐
- Nei, litt for lett ☐
- Nei, altfor lett ☐

36 Hvor mange ganger har du med hensikt gått ned mer enn 5 kg i vekt i løpet av de siste 5 år?

- Aldri ☐
- 1-2 ganger ☐
- 3 ganger eller mer ☐

37 Har du ufrivillig gått ned mer enn 5 kg i vekt siste 6 måneder?

Nei	Ja
☐	☐

OPPVEKST, DA DU VAR 0-18 ÅR

38 Hvem vokste du opp sammen med?
(Flere kryss mulig)

- Mor ☐
- Stemor ☐
- Far ☐
- Stefar ☐
- Foster-/pleieforeldre ☐
- Søsken ☐
- Andre barn under 18 år ☐
- Andre voksne ☐

39 Ble dine foreldre skilt, eller flyttet de fra hverandre, da du var barn?

Nei	Ja, før jeg var 7 år	Ja, da jeg var 7–18 år
☐	☐	☐

40 Døde noen av dine foreldre da du var barn?

Nei	Ja, før jeg var 7 år	Ja, da jeg var 7–18 år
☐	☐	☐

41 Var det mye krangling, uro, konflikter eller vanskelig kommunikasjon i barndomshjemmet?

- I svært høy grad ☐
- I høy grad ☐
- I liten grad ☐
- I svært liten grad ☐
- Ikke i det hele tatt ☐

42 Kunne du i oppveksten søke støtte hos en voksen person som du var trygg på?

- I svært høy grad ☐
- I høy grad ☐
- I liten grad ☐
- I svært liten grad ☐
- Ikke i det hele tatt ☐

43 Sliter du med vonde minner fra oppveksten pga. tap, svik, vanskjøtsel, vold, mishandling eller misbruk?

- I svært høy grad ☐
- I høy grad ☐
- I liten grad ☐
- I svært liten grad ☐
- Ikke i det hele tatt ☐

44 Når du tenker på barndommen/oppveksten din, vil du beskrive den som:

- Svært god ☐
- God ☐
- Middels ☐
- Vanskelig ☐
- Svært vanskelig ☐

UTDANNING OG INNTEKT

45 Hvilken utdanning er den høyeste du har fullført? *(Sett ett kryss)*

Med grunnskole menes barne- og ungdomsskole, framhaldsskole, folkehøyskole.
Med 1-2 årig videregående menes realskole, middelskole, yrkesskole.

- Grunnskole ☐
- 1-2 årig videregående skole ☐
- 3 år i videregående skole ☐
- Fagbrev eller svennebrev ☐
- Høyskole/universitet, mindre enn 4 år ☐
- Høyskole/universitet, 4 år eller mer ☐

46 Hva er din husstands samlede inntekt siste år (brutto-inntekt)? Ta med alle inntekter fra arbeid, trygder, sosialhjelp og lignende. *(Sett ett kryss)*

- Under 250 000 kr ☐
- 250 000-450 000 kr ☐
- 451 000-750 000 kr ☐
- 751 000-1 000 000 kr ☐
- Over 1 000 000 kr ☐

BOSITUASJON

47 Bor du sammen med noen? *(Flere kryss mulig)*

- ☐ Nei, jeg bor alene
- ☐ Ja, ektefelle/samboer/partner
- ☐ Ja, andre personer 18 år eller eldre:

  HVIS JA:
  Hvor mange andre over 18 år? ☐☐ Antall

- ☐ Ja, barn under 18 år:

  HVIS JA:
  Hvor mange barn under 18 år? ☐☐ Antall

ALT I ALT

48 Når du tenker på hvordan du har det for tida, er du stort sett fornøyd med tilværelsen eller er du stort sett misfornøyd? *(Sett ett kryss)*

- Svært fornøyd ☐
- Meget fornøyd ☐
- Ganske fornøyd ☐
- Både/og ☐
- Nokså misfornøyd ☐
- Meget misfornøyd ☐
- Svært misfornøyd ☐

Lever det utfylte skjemaet når du møter på feltstasjonen.
Takk for hjelpen!

Appendix B Arthritis questionnaire (nt4arthq1)

HUNT4

LEDDPLAGER

Takk for at du møtte til HUNT4. Du har fått dette skjemaet fordi du har svart ja på ett eller flere spørsmål om ledd- eller muskelplager.

- VENNLIGST FYLL UT SKJEMAET
- LEGG DET I SVARKONVOLUTTEN
- POST DET SNAREST MULIG
- PORTO ER BETALT

Vennlig hilsen
Helseundersøkelsen i Nord-Trøndelag
Telefon 74 07 51 80 / e-post hunt@medisin.ntnu.no

LES DETTE FØR DU STARTER

Skjemaet skal leses maskinelt.
Følg derfor disse instruksjonene:

- Bruk svart/blå kulepenn eller en god blyant.
- Kryss av slik: ☒
- Krysser du feil, fyller du hele feltet med farge, slik: ■ Sett så kryss i rett felt.
- Sett bare ett kryss for hvert spørsmål om ikke annet er oppgitt.
- Bruk hele tall når du fyller inn antall år eller antall ganger, slik: 5 2

1 Hvor gammel var du da du fikk leddplager for første gang? ☐☐ år gammel

2 Har en lege sagt at du har følgende diagnoser? I så fall, hvor gammel var du første gang?

	Nei	Ja	Alder første gang?
Revmatoid artritt/ leddgikt	☐	☐	☐☐ år gammel
Psoriasis artritt/ psoriasisleddgikt	☐	☐	☐☐ år gammel
Bekhterevs/ankyloserende spondylitt/spondylartritt	☐	☐	☐☐ år gammel
Slitasjegikt/artrose	☐	☐	☐☐ år gammel
Fibromyalgi	☐	☐	☐☐ år gammel
Crohns sykdom eller ulcerøs kolitt	☐	☐	☐☐ år gammel
Psoriasis	☐	☐	☐☐ år gammel

SKADER OG OPERASJONER

3 Har du hatt brudd eller skader i området hvor du nå har plager? Nei ☐ Ja ☐

4 Er du operert i ryggen? Nei ☐ Ja ☐

5 Har dine søsken, foreldre eller barn følgende sykdommer?

	Nei	Ja
Revmatoid artritt/leddgikt	☐	☐
Psoriasis eller psoriasisleddgikt	☐	☐
Bekhterevs/ankyloserende spondylitt/ spondylartritt	☐	☐

6 Hvor mange ganger har du vært hos revmatolog eller revmatologisk sykepleier?

- Aldri ☐
- 1-5 ganger ☐
- 6-10 ganger ☐
- Mer enn 10 ganger ☐

7 Har du brukt disse medisinene?

	Nei	Ja
Prednisolon	☐	☐
Methotrexat, Metex	☐	☐
Remicade, Remsima, Inflectra, Infliximab	☐	☐
Salazopyrin	☐	☐
Humira, Adalimumab	☐	☐
Enbrel, Benapali, Etanercept	☐	☐
MabThera, Rituximab	☐	☐
Cimzia	☐	☐
Simponi	☐	☐
RoActemra	☐	☐
Orencia	☐	☐

Side ☐ av 2

INTENSITET AV PLAGER

8 *For hvert av punktene nedenfor, sett kryss i boksen som passer best for deg.*

Hvor intense har leddplagene dine vært de siste seks månedene?

Ingen ☐☐☐☐☐☐☐☐☐☐ Svært intense

Hvor intense er leddsmertene dine i dag?

Ingen ☐☐☐☐☐☐☐☐☐☐ Svært intense

Hvor mye er du plaget i dag av ømme eller hovne ledd?

Ingen ☐☐☐☐☐☐☐☐☐☐ Svært mye

Hvordan vil du beskrive din generelle helsetilstand i dag?

Utmerket ☐☐☐☐☐☐☐☐☐☐ Svært dårlig

I hvor stor grad er du plaget av utmattelse eller trøtthet?

Ingen ☐☐☐☐☐☐☐☐☐☐ Svært mye

Hvor mye smerter har du i nakke, rygg eller hofter?

Ingen ☐☐☐☐☐☐☐☐☐☐ Svært mye

Hvis du får vondt ved trykk eller berøring i en del av kroppen, hvor sterke er smertene?

Ingen ☐☐☐☐☐☐☐☐☐☐ Svært sterke

Hvor mye leddstivhet har du når du våkner om morgenen?

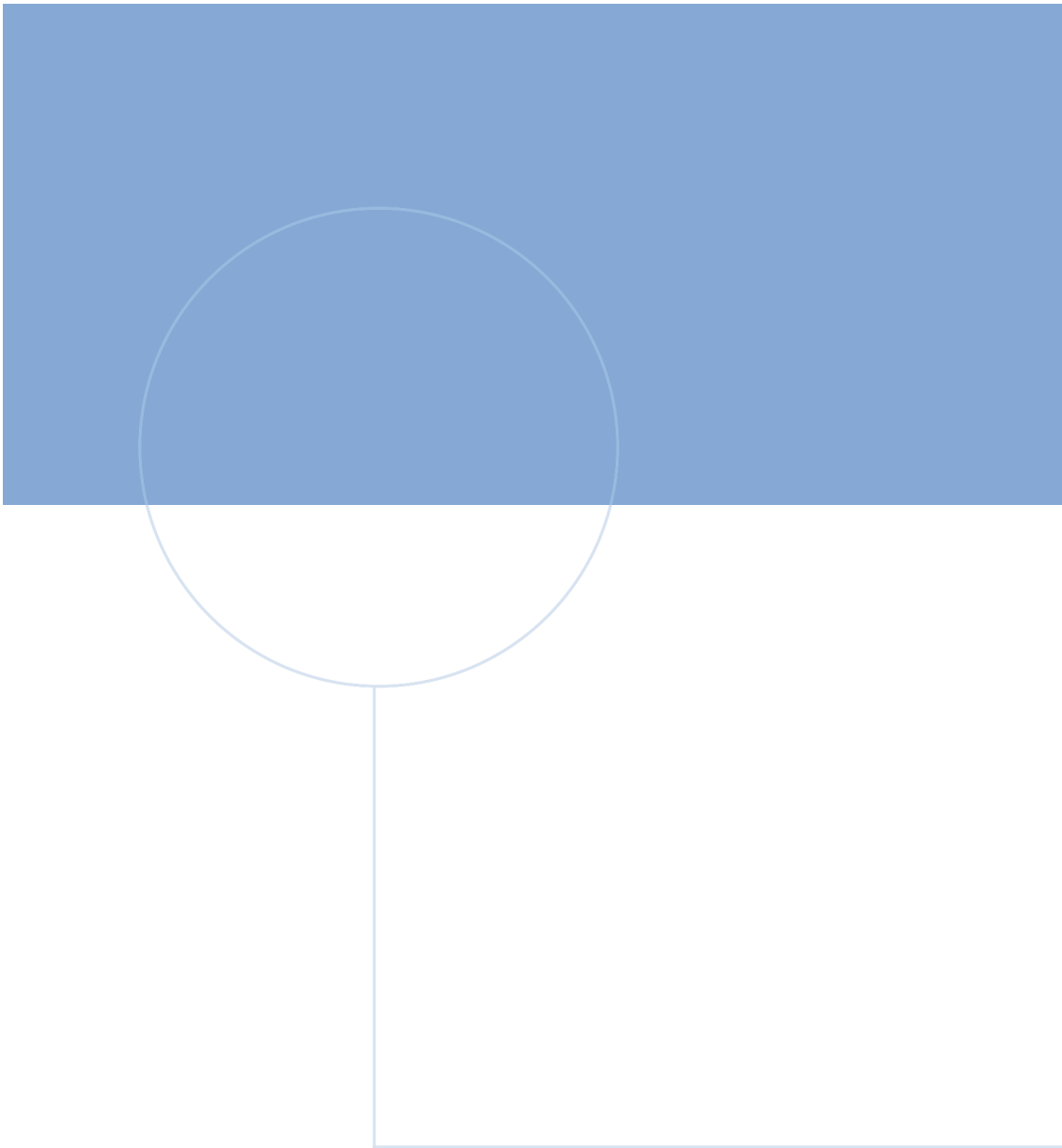
Ingen ☐☐☐☐☐☐☐☐☐☐ Svært mye

Hvis du har morgenstivhet, hvor lenge varer den fra det tidspunktet du våkner?

0 timer ☐☐☐☐☐☐☐☐☐☐ 2 timer eller mer

9 **Hvordan har din fysiske funksjon vært den siste uken?**

	Klarer uten problem	Klarer med litt problemer	Klarer med store problemer	Klarer ikke
Kle på deg, inkludert skolisser og knapper	☐	☐	☐	☐
Stå opp av senga	☐	☐	☐	☐
Løfte et fullt glass med vann til munnen	☐	☐	☐	☐
Gå utendørs på flat grunn som ikke er glatt	☐	☐	☐	☐
Vaske og tørke hele kroppen	☐	☐	☐	☐
Bøye deg og ta opp noe fra gulvet	☐	☐	☐	☐
Åpne et syltetøyglass med skrulokk	☐	☐	☐	☐
Gå inn og ut av en bil	☐	☐	☐	☐



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