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Cohort profile: A Nation-wide cohort of Finnish military recruits born 1958

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Abbreviations: BMI=Body Mass Index, FCR=Finnish Cancer Registry, FDF=Finnish Defence Forces, HR=Hazard Ratio, PA=Physical Activity, PC=Physical Condition, PIC=Personal Identity Code, SIR=Standardised Incidence Ratio, CI=Confidence Interval

Abstract

Purpose: The cohort was set up to study the impact of lifestyle factors in early adulthood on disease outcomes, with a focus on assessing the influence of body composition and physical performance in early adulthood on subsequent cancer risk.

Participants: Men born in 1958 who performed their military service between the ages of 17 and 30 years of age were included in this study (n=31 158). They were eligible for military service if they were healthy or had only minor health problems diagnosed by the beginning of the service. Men with chronic illnesses requiring regular medication or treatment were not eligible for service. Comprehensive health data including diagnosed illnesses, anthropometric and health behaviour were collected at the beginning and at the end of military service, including data from medical check-ups.

Findings to date: During the follow-up 1124 new cancer cases diagnosed between baseline (i.e. end of the military service for each individual) and end of the year 2014. Overweight (BMI≥25 kg/m^2) and obesity (BMI≥30 kgm^2) were associated with an overall increased risk of cancer (age-adjusted HR: 1.08, 95% confidence interval (CI): 0.89-1.30), a good or excellent PC significantly reduced cancer risk (HR 0.82, 95% CI: 0.71-0.95).

Future plans: The dataset offers the possibility of linkage with other databases, such as Finnish Cancer Registry (e.g. primary site of the tumour, morphology, time of detection, spreading and primary treatment), vital statistics (date of emigration or deaths), censuses (socioeconomic indicators), hospital discharge data (comorbidity) and population surveys (life habits).

Strengths and limitations of this study

Strengths

1. The large number of a proportion-representative sample of men born in 1958 in Finland included in this study
2. A thorough evaluation performed by medical personnel and measurement of different health variables in a uniform manner
3. Possibility for a wide range of linkages with different registries

Weaknesses

1. The cohort is not fully representative of the male population born in 1958, which means that the results cannot be fully generalised to the entire population. Those suffering from chronically bad health before military service and those who chose to pursue their national service in civil service for any reason (ethical, religious) were not included in the cohort
2. We only have data from the military conscripts collected during their military service, when their average age was 20 years
3. At present the cohort is still relatively young, with moderate number of cancer cases or deaths

Introduction

The Finnish Military Recruits Cohort was set up to study the impact of several lifestyle factors in early adulthood on disease outcomes. Military service in Finland is mandatory for men at the age of 17-30 years for a period of 8-11 months, meaning that virtually every Finnish man can be traced back in military records. In 2012, we started electronic transcription of the paper-based medical examination records at entry and exit of the mandatory military service of all men born in 1958. These records contain demographic information, data on common health risk factors such as tobacco smoking or height and weight, measurements of general physical performance, a standard medical examination such as blood pressure, results of basic urine examinations (sugar, proteins, leucocytes, nitrites, bacteria) and eyesight screening tests as well as self-reported health status.

One of the initial aims of this study was to document and assess the influence of early adulthood body composition and physical performance on adult cancer risk. This was

motivated by the increasing burden of disease particularly in high-income countries such as Finland that has been linked to the growing proportion of the population with insufficient physical activity and high body weight. Regular physical activity (PA) and a healthy body weight have been reported to positively impact general health and have been associated with lower risks of several non-communicable diseases including cardiovascular diseases(1), diabetes(2), and cancer(3, 4).

In men, regular PA shows sufficient evidence to protect from colorectal cancer(5, 6). Similar associations have also been suggested for prostate(7-9) and bladder cancer, yet evidence is still inconsistent(10, 11). Previous research from Finland has shown that the incidence of cancer among world-class male athletes is reduced when compared to the general population, with the largest risk reduction seen in lung cancer (Standardised Incidence Ratio (SIR) 0.40, 95% confidence interval (CI): 0.27-0.55) and kidney cancer (SIR 0.23, 95%CI: 0.06-0.57) (12, 13). As for high body weight, a handful of cancer sites have been causally linked to body weight, including cancers of the oesophagus (adenocarcinoma), gastric cardia, colorectum, gallbladder, pancreas, liver, breast (post-menopausal), endometrium, ovary, kidney and prostate (non-localised)(14).

Two trained clerks performed the data extraction into electronic format from paper based military records (hardcopy). The quality of the collected data was continuously monitored both by check-up tools built in the data input program and by following the summary input statistics.

Cohort description

The cohort consists of men born in 1958, who served in the Finnish Defence Forces (FDF). There is a universal male conscription in Finland for either military service or civil service, which is usually completed at the age of 20 years of age. At the time of the service of the cohort in question (entry between 1975-1989), men were liable to serve between 240 and 330 days depending on the level of training they were to receive. Of the men born in 1958, almost 90% started their military service, while the rest either served in civil service or were completely liberated from the service.

In total, the cohort comprises 31 158 men born in 1958, who were randomly selected from the total population and represent 74% of all Finnish men born 1958. The average age at study entry was 20 years (range 17-31 years). In the end of 2014, 91% of all study participants were still alive.

During their military service the conscripts were followed-up by health-care professionals at least twice (in the beginning and at the end of their military service). Their physical condition (PC) was recorded at least once during their military service. Owing to unique person identifiers, record linkage with health and administrative databases allow for a wide range of epidemiological studies on different outcomes in this cohort. Follow-up for incident cancers is currently available until the end of 2014, with annual updates envisaged depending on relevant research questions.

Box 1. List of the variables collected at study entry for each member of the cohort

Personal Identity Code of the individual
Professional group
Marital status
Beginning of military service (date)
End of military service (date)
Reason for preliminary discontinuation of military service (diagnosis)
Duration of military service
Military service classifications at different stages of the service
Classification diagnoses at different stages of the military service
Self-perceived health status in the beginning and in the end of the service

Height and weight at different stages of the service
Blood pressure at different stages of the service
Physical condition test results at different stages of the service - 12-minute running test results - Muscle strength test results
Smoking status and amount smoked at different stages of the service
Use of alcohol and the amount smoked at different stages of the service

What has been measured?

At the start of military service (baseline)

All baseline measurements were performed by health-care professionals (nurses, physicians and dentists) in the beginning of the military service (between 1975 and 1989). After an initial health check, a fitness classification (A-E) was assigned to each conscript, based on his health. Class A indicates good physical and mental health and capability of field service. Men with B-classification were fit for lighter service troops, with health conditions not needing regular treatment or medication, e.g. flat foot. C-classified men were liberated from peacetime service and D-classified men are exempt from military service completely. Men classified as C typically need regular treatment for their condition (e.g. diabetes) but are otherwise healthy and can thus be drafted at wartime. D-classified men have a condition that affects their daily life so seriously, that they cannot be drafted even during wartime. E-classification means deferment for medical reasons up to 3 years. Diagnoses leading to E-classification are typically young men's adjustment disorders(15).

After the baseline medical check-up, the basic PC of the conscripts was measured by a 12-minute running test and a test measuring muscle strength. Data on health-behaviour (e.g. smoking habits and alcohol consumption) were collected during the medical check-ups. A

detailed list of all demographic, behavioural and health data items collected at baseline is presented in Box 1. At recruitment, 91.5% of the men were healthy (classified to service class A), and 7.1% had minor health problems (service class B) (Table 1). In addition, 411 men were classified to service classes C, D or E before the end of the military service (beginning of the follow-up). The majority of all men had a normal weight at recruitment (Body Mass Index, BMI 18.5-25 kg/m^2), 10.6% were overweight (BMI 25-30 kg/m^2) and 1.4% obese (BMI>30 kg/m^2). Overall PC was excellent in 17.7%, good in 40.8%, and satisfactory or bad in 24.5%. Most men with BMI<25 were also in a good or excellent PC, whereas the overweight and obese men (BMI≥25) were more likely to be in a satisfactory or bad PC. Overall, 51.6% of the men were non-smokers, and 26.0% stated at the beginning of their military service that they didn't consume any alcohol.

In the end of military service

Typically, assessments of PC take place at least twice during the military service of each conscript, including medical check-ups in the beginning and in the end of military service. The medical check-up at the end of military service has the same elements as the check-up in the beginning even though it is usually not as rigorously followed as the medical check-up in the beginning. This is because self-perceived health is considered the most important health indicator at the end of the service, only significant changes in this indicator leads to a rigorous medical check-up.

Follow-up via record linkage

After a complete transcription of the military records, the cohort data were linked with the Finnish Cancer Registry (FCR); National Population Registry (date of emigration or death); and censuses (socioeconomic indicators), hospital discharge data (morbidity) and the cause-of-death register at Statistics Finland. The linkage required approvals by the FDF and the National Institute of Health and Welfare in Finland (THL). The high-quality FCR data contains information on cancer diagnosis date, type and location of the cancer (topography), morphology, spreading of the cancer, and the primary treatment method(16).

All record linkages were performed using the unique personal identity code (PIC) given to every resident of Finland. We first linked the cohort to the population database, and checked that every person existed in the population either alive, or with date of emigration or death.

In our raw data collection system we had a built-in mechanism for checking the correct format of the PICs. Only 26 PICs were not found in the population registry. In addition we had one PIC of wrong gender. These individuals were excluded from the cohort.

The same PIC is used in Finland throughout all registries. We used this in linking the data from different registries. PICs were collected from the paper-based files. We then linked these data with possible dates of emigration or death from the Population Register Centre of Finland. The linkage with Finnish Cancer Registry's data on cancer cases in this population was also done using the PIC as a key.

Findings to date

In this first presentation of this cohort, we demonstrate the linkage that was done with the FCR to obtain data on cancer incidence. We furthermore assessed the association between tobacco smoking, alcohol use, and anthropometric measures as reported in young adulthood (at study baseline) and cancer risk. All men, except those with a missing, or C or D, service classification before the end of the military service (altogether n=411) and those with a cancer diagnosis before the before the end of the military service (n=5) were included in the follow-up. The final study sample for follow-up comprised 30 742 men.

During the follow-up 1124 new cancer cases diagnosed between baseline (i.e. end of the military service for each individual) and end of the year 2014. Study variables were body mass index (BMI, weight in kg divided by height in meters squared), overall PC (excellent/good/satisfying/bad), service classification (A/B), smoking status (yes/no) and amount (cigarettes/day), and alcohol use (yes/no). Cox proportional hazard models with age as underlying time metric were fitted to estimate hazard ratios (HR) and 95% confidence intervals (CI) for the relation between each study variable and the risk of developing invasive site-specific cancer. Subjects were censored if they emigrated from Finland or died before the

end of follow-up (December 31, 2014), whichever occurred first. For all outcomes, three models were fitted with the following adjustments. While in model 1, univariate associations were tested (model 2) was additionally adjusted for PC (for models including BMI), BMI (for models including PC) and their interaction. In model 3, smoking status, alcohol consumption and service class were additionally introduced into the model. In secondary analyses, we repeated the main analyses in non-smokers only. All analyses were carried out using Stata 13.

More than three decades after the end of their military service, this is the first epidemiological assessment of the impact of PC, body composition and certain lifestyle factors (e.g. smoking, alcohol consumption), measured in young adulthood, on cancer risk later in life.

While overweight (BMI≥25 kg/m^2) and obesity (BMI≥30 kgm^2) were associated with an overall increased risk of cancer (age-adjusted HR: 1.08, 95% confidence interval (CI): 0.89-1.30), a good or excellent PC significantly reduced cancer risk (HR 0.82, 95% CI: 0.71-0.95). When compared to those with normal weight and good PC, those with normal weight but bad PC had an increased risk of all cancers combined (HR 1.18, 95% CI: 1.01-1.38), which was even more pronounced in those who were in bad PC and also were overweight (HR 1.30, 95% CI: 1.01-1.69), when compared to those with normal weight and good PC. These associations however became statistically insignificant when they were further adjusted for smoking, alcohol consumption, service class and an interaction term between PC and overweight. Men in service class B were at a more than 3-fold higher risk of advanced prostate cancer as compared to those in service class A [Multivariate (MV)-adjusted HR: 3.35, 95% CI: 1.14-9.90)]. When repeating the analyses among non-smokers (n=15 860), the patterns found in the main analysis were confirmed and strengthened.

To further validate health indicators available for this cohort, we also observed a dose response relationship between the number of cigarettes smoked daily and total cancer incidence. The HR among those who smoked 20 cigarettes or more per day was 1.54 (95% CI: 1.25-1.89). Increased risk was most pronounced for incidence of lung cancer.

Table 1. Cohort characteristics at study entry (n=31 158)	N	%
Service classification (n, %)		
A (healthy)	28 520	91,5%
B (minor health problems)	2 227	7,1%
C or D	192	0,6%
Missing	219	0,7%
Smoking status (n, %)		
Yes	10 707	34,4%
No	16 066	51,6%
Missing	4 385	14,1%
Cigarettes/day among smokers (n, %)		
<10 cigarettes/day	2 010	18,8%
10-19 cigarettes/day	5 657	52,8%
≥20 cigarettes/day	2 862	26,7%
Missing	178	1,7%
Alcohol consumption (n, %)		
Yes	19 052	61,1%
No	8 097	26,0%
Missing	4 009	12,9%
Body mass index (n, %)		
Underweight (BMI<18.5)	1 489	4,8%
Normal weight (18.5≤BMI<25)	25 939	83,2%
Overweight (25≤BMI<30)	3 294	10,6%
Obesity (BMI≥30)	421	1,4%
Missing	15	0,0%
Body surface area (n, %)		
<2 m^2	26 729	85,8%
≥2 m^2	4 415	14,2%
Missing	14	0,0%
Overall physical condition		
Bad	1 326	4,3%
Satisfying	6 294	20,2%
Good	12 707	40,8%
Excellent	5 503	17,7%
Missing	5 328	17,1%
BMI & physical condition crosscategory		
BMI<25 & good/excellent PC	16 930	54,3%
BMI≥25 & good/excellent PC	1 277	4,1%
BMI<25 & bad/satisfying PC	6 001	19,3%
BMI≥25 & bad/satisfying PC	1 618	5,2%
Missing	5 332	17,1%

The main strengths and weaknesses

The main strength of this study is the large number of a proportion-representative sample of men born in 1958 in Finland included in this study. A thorough evaluation performed by medical personnel and measurement of different health variables including general health and PC measured in a uniform manner. Situated in Finland, this cohort provides the possibility for a wide range of linkages with different registries. In this first study, we linked the cohort data to the Finnish Cancer Registry and validated associations with most common risk factors.

Some weaknesses should be noted in relation to these data. First, the cohort is not fully representative of the male population born in 1958, which means that the results cannot be fully generalised to the entire population. Those suffering from chronically bad health (e.g. development disorders or mental disorders) before military service and those who chose to pursue their national service in civil service for, i.e., religious, ethical or other reasons were not included in the cohort.

Second, we only have data from the military conscripts collected during their military service, lasting between eight to 11 months. The conscripts were between the ages of 17 and 30 at the beginning of their military service. We do not have data on possible changes in their health habits after the completion of their service. Considering the relative stabile life habits in majority of population and the long lag related to cancer development, we believe that the changes in the health habits do not markedly confound our results. In the future, linkage with national population survey data, such as the FINRISK-study, which is conducted every 5 years since 1972(17), will allow for better understanding of the magnitude of changes in the risk factors measured during the military service, as well as other risk factors.

Third, at present the cohort is still relatively young, with moderate number of cancer cases or deaths. However, preliminary results of this cohort show that it can already be used for epidemiologic purposes and will become even more interesting as the cohort grows older.

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We would like to thank the important work done by Ms Päivi Haapakangas and Ms Anna Kaisa Pasanen, who collected and digitalized the data. Without their work this study would be impossible.

Conflicts of interests

None.

Data Sharing Statement

The study data are not freely available due to confidentiality reasons, but the research team welcomes potential collaboration with other researchers. At present no additional unpublished data are available. For further information contact Professor Eero Pukkala based at the Finnish Cancer Registry (eero.pukkala@cancer.fi) or Dr Jorma Sormunen (jorma.sormunen@fimnet.fi).

Contributorship statement

JS, EP, MA, IS: Study planning, data collection, data analysis, manuscript authoring. All have contributed equally. JS: Project management.

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Checklist statement

A checklist is not required for this article type (cohort profile).

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Future plans: The dataset offers the possibility of linkage with other databases, such as Finnish Cancer Registry (e.g. primary site of the tumour, morphology, time of detection, spreading and primary treatment), vital statistics (date of emigration or deaths), censuses (socioeconomic indicators), hospital discharge data (comorbidity) and population surveys (life habits).

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Professional group
Marital status
Beginning of military service (date)
End of military service (date)
Reason for preliminary discontinuation of military service (diagnosis)
Duration of military service
Military service classifications at different stages of the service
Classification diagnoses at different stages of the military service

Self-perceived health status in the beginning and in the end of the service
Height and weight at different stages of the service
Blood pressure at different stages of the service
Physical condition test results at different stages of the service - 12-minute running test results - Muscle strength test results
Smoking status and amount smoked at different stages of the service
Use of alcohol and the amount drunken at different stages of the service

What has been measured?

At the start of military service (baseline)

All baseline measurements were performed by health-care professionals (nurses, physicians and dentists) in the beginning of the military service (between 1975 and 1989). After an initial health check, a fitness classification (A-E) was assigned to each conscript, based on his health. Class A indicates good physical and mental health and capability of field service. Men with B-classification were fit for lighter service troops, with health conditions not needing regular treatment or medication, e.g. flat foot. C-classified men were liberated from peacetime service and D-classified men are exempt from military service completely. Men classified as C typically need regular treatment for their condition (e.g. diabetes) but are otherwise healthy and can thus be drafted at wartime. D-classified men have a condition that affects their daily life so seriously, that they cannot be drafted even during wartime. E-classification means deferment for medical reasons up to 3 years. Diagnoses leading to E-classification are typically young men's adjustment disorders(15).

After the baseline medical check-up, the basic PC of the conscripts was measured by a 12-minute running test and a test measuring muscle strength. Data on health-behaviour (e.g. smoking habits and alcohol consumption) were collected during the medical check-ups. A detailed list of all demographic, behavioural and health data items collected at baseline is presented in Box 1. At recruitment, 91.5% of the men were healthy (classified to service class A), and 7.1% had minor health problems (service class B) (Table 1). In addition, 411 men were classified to service classes C, D or E before the end of the military service (beginning of the follow-up). The majority of all men had a normal weight at recruitment (Body Mass Index, BMI 18.5-25 kg/m^2), 10.6% were overweight (BMI 25-30 kg/m^2) and 1.4% obese (BMI>30 kg/m^2). Overall PC was excellent in 17.7%, good in 40.8%, and satisfactory or bad in 24.5%. Most men with BMI<25 were also in a good or excellent PC, whereas the overweight and obese men (BMI≥25) were more likely to be in a satisfactory or bad PC. Overall, 51.6% of the men were non-smokers, and 26.0% stated at the beginning of their military service that they did not consume any alcohol. The number of men in service classes C and D was small that these data are not separately reported.

In the end of military service

Typically, assessments of PC take place at least twice during the military service of each conscript, including medical check-ups in the beginning and in the end of military service. The medical check-up at the end of military service has the same elements as the check-up in the beginning even though it is usually not as rigorously followed as the medical check-up in the beginning. This is because self-perceived health is considered the most important health indicator at the end of the service, only significant changes in this indicator leads to a rigorous medical check-up.

Follow-up via record linkage

After a complete transcription of the military records, the cohort data were linked with the Finnish Cancer Registry (FCR); National Population Registry (date of emigration or death); and censuses (socioeconomic indicators), hospital discharge data (morbidity) and the cause-of-death register at Statistics Finland. The linkage required approvals by the FDF and the

National Institute of Health and Welfare in Finland (THL). The high-quality FCR data contains information on cancer diagnosis date, type and location of the cancer (topography), morphology, spreading of the cancer, and the primary treatment method(16).

All record linkages were performed using the unique personal identity code (PIC) given to every resident of Finland and used as the key in all registries in Finland. PICs of the men in the cohort collected from the paper-based files were first linked to the Population Registry, and checked that every person existed in the population either alive, or with date of emigration or death.

In our raw data collection system we had a built-in mechanism for checking the correct format of the PICs. Only 26 PICs were not found in the population registry. In addition we had one PIC of wrong gender. These individuals were excluded from the cohort.

Statistical methods

Cox proportional hazard models with age as underlying time metric were fitted to estimate hazard ratios (HR) and 95% confidence intervals (CI) for the relation between each study variable and the risk of developing malignant cancer by site. Subjects were censored as they emigrated from Finland or died before the end of follow-up (December 31, 2014), whichever occurred first. All analyses were carried out using Stata 13.

Results - Findings to date

In this first presentation of this cohort we demonstrate the linkage that was done with the FCR to obtain data on cancer incidence. We furthermore assessed the association between tobacco smoking, alcohol use, and anthropometric measures as reported in young adulthood (at study baseline) and cancer risk. All men, except those with a missing service classification (n=219), those with service classification C or D (n=192), and those with a cancer diagnosis before the before the end of the military service (n=5) were included in the follow-up. The final study sample comprised 30 742 men.

During the follow-up 1124 new cancer cases diagnosed between baseline (i.e. end of the military service for each individual) and end of the year 2014. Study variables were body mass index (BMI, weight in kg divided by height in meters squared), overall PC (excellent/good/satisfying/bad), service classification (A/B), smoking status (yes/no) and amount (cigarettes/day), and alcohol use (yes/no).

More than three decades after the end of their military service, this is the first epidemiological assessment of the impact of PC, body composition and certain lifestyle factors (e.g. smoking, alcohol consumption), measured in young adulthood, on cancer risk later in life.

While overweight (BMI≥25 kg/m^2) and obesity (BMI≥30 kgm^2) were associated with an overall increased, but statistically not significant, risk of cancer (age-adjusted HR: 1.08, 95% confidence interval (CI): 0.89-1.30). A good or excellent PC significantly reduced cancer risk (HR 0.82, 95% CI: 0.71-0.95). When compared to those with normal weight and good PC, those with normal weight but bad PC had an increased risk of all cancers combined (HR: 1.18, 95% CI: 1.01-1.38). Men who were in poor PC and also were overweight had an HR of 1.30 (95% CI: 1.01-1.69), when compared to those with normal weight and good PC. These associations however decreased and became statistically insignificant [respective HRs 1.05 (95% CI: 0.88-1.26), and 1.13 (95% CI:0.85-1.50)] when adjusted for smoking, alcohol consumption and service class. Men in service class B were at a more than 3-fold higher risk of advanced prostate cancer as compared to those in service class A (HR adjusted for age, PC, BMI, smoking and alcohol use: 3.35, 95% CI: 1.14-9.90).

To further validate health indicators available for this cohort, we also observed a dose response relationship between the number of cigarettes smoked daily and total cancer incidence. The HR among those who smoked 20 cigarettes or more per day was 1.54 (95% CI: 1.25-1.89). Increased risk was most pronounced for incidence of lung cancer (HR 9.65, 95% CI: 4.83-19.27).

Table 1. Cohort characteristics at study entry (n=31 158)

	N	%
Service classification (n, %)		
A (healthy)	28 520	91.5%
B (minor health problems)	2 227	7.1%
C or D	192	0.6%
Missing	219	0.7%
Smoking status (n, %)		
Yes	10 707	34.4%
No	16 066	51.6%
Missing	4 385	14.1%
Cigarettes/day among smokers (n, %)		
<10 cigarettes/day	2 010	18.8%
10-19 cigarettes/day	5 657	52.8%
≥20 cigarettes/day	2 862	26.7%
Missing	178	1.7%
Alcohol consumption (n, %)		
Yes	19 052	61.1%
No	8 097	26.0%
Missing	4 009	12.9%
Body mass index (n, %)		
Underweight (BMI<18.5)	1 489	4.8%
Normal weight (18.5≤BMI<25)	25 939	83.2%
Overweight (25≤BMI<30)	3 294	10.6%
Obesity (BMI≥30)	421	1.4%
Missing	15	0.0%
Body surface area (n, %)		
<2 m^2	26 729	85.8%
≥2 m^2	4 415	14.2%
Missing	14	0.0%
Overall physical condition		
Bad	1 326	4.3%
Satisfying	6 294	20.2%
Good	12 707	40.8%
Excellent	5 503	17.7%
Missing	5 328	17.1%
BMI & physical condition crosscategory		
BMI<25 & good/excellent PC	16 930	54.3%
BMI≥25 & good/excellent PC	1 277	4.1%
BMI<25 & bad/satisfying PC	6 001	19.3%
BMI≥25 & bad/satisfying PC	1 618	5.2%
Missing	5 332	17.1%

The main strengths and weaknesses

The main strength of this study is the large number of a proportion-representative sample of men born in 1958 in Finland included in this study. A thorough evaluation performed by medical personnel and measurement of different health variables including general health and PC measured in a uniform manner. The FDF have a thorough training protocol for all military and medical personnel especially for classifying service class and to measure PC. Over the 14-year period (1975-1989) during which the men in the cohort completed their service, there were neither new service class classifications nor PC-measurement methods introduced in the FDF. We believe the data that collected from the military records are of high quality.

Situated in Finland, this cohort provides the possibility for a wide range of linkages with different registries. In this first study, we linked the cohort data to the Finnish Cancer Registry and validated associations with BMI, PC and smoking.

Usually ill-health seems to be associated with poor PC or high BMI, which in turn are related to some other factors typical with low SES. Finland has tried to take steps in order to decrease these risks. Due to cheap universal health coverage in Finland, all Finns have similar access to healthcare independent of their financial or SES. In addition to this, most Finnish municipalities encourage people to improve their health by physical exercise and by offering planned activities for people of all ages, even people with disabilities.

Some weaknesses should be noted in relation to these data. First, the cohort is not fully representative of the male population born in 1958, which means that the results cannot be fully generalised to the entire population. Those suffering from chronically bad health (e.g. development disorders or mental disorders) before military service and those who chose to pursue their national service in civil service for religious, ethical or other reasons were not included in the cohort, but their proportion is small.

Second, we only have data from the military conscripts collected during their military service, lasting between eight and 11 months. The conscripts were between the ages of 17 and 30 at the beginning of their military service. We do not have data on possible changes in their health habits after the completion of their service. Considering the relative stabile life habits in

majority of population and the long lag related to cancer development, we believe that the changes in the health habits do not markedly confound our results. In the future, linkage with national population survey data, such as the FINRISK-study, which is conducted every 5 years since 1972(17), will allow for better understanding of the magnitude of changes in the risk factors measured during the military service, as well as other risk factors. A marked proportion of the young-age cancers detected up-to-date may have a genetic background which was not taken into account in the present analyses. It is however possible to identify first-degree family members of the men in our cohort from the Finnish Population Registry, and then link their PICs to the FCR to get information on cancer cases in family.

At present the cohort is still relatively young, with moderate number of cancer cases or deaths. However, preliminary results of this cohort show that it can already be used for epidemiologic purposes and will become even more interesting as the cohort grows older.

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Conflicts of interests

None.

Data Sharing Statement

The study data are not freely available due to confidentiality reasons, but the research team welcomes potential collaboration with other researchers. For further information contact Professor Eero Pukkala based at the Finnish Cancer Registry (eero.pukkala@cancer.fi) or Dr Jorma Sormunen (jorma.sormunen@fimnet.fi).

Contributorship statement

JS, EP, MA, IS: Study planning, data collection, data analysis, manuscript authoring. All have contributed equally. JS: Project management.

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Checklist statement

A checklist is not required for this article type (cohort profile).