SELF-REPORTED DEPRESSIVE AND ANXIETY SYMPTOMS ASSOCIATED WITH FITNESS FOR MILITARY SERVICE AND SOCIAL-COMMUNICATIVE SKILLS IN YOUNG FINNISH MEN

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ABSTRACT

Studies on the association of self-reported depressive and anxiety symptoms with release from the compulsory military service at the military call-up and with social-communicative difficulties are scarce.

This study is a part of population-based cross-sectional 'Young Men in the North' project (N = 2614 men, mean age 18.1). The Finnish Defence Forces arranges compulsory military call-ups for all Finnish 18-year-old male citizens, where our study subjects and filled out the study questionnaire including Raitasalo's modification of the Short Form of Beck Depression Inventory (R-BDI) and Generalized Anxiety Disorder 7-item scale (GAD-7), and three questions on social-communicative difficulties based on the DSM-5 diagnostic criteria. Young men's fitness for military service (fit, permanent or temporary release) was obtained from the call-up board.

Self-reported depressive symptoms were associated with permanent (OR = 6.6; 95% CI 3.88-11.20) and temporary (OR = 9.2; 95% CI 5.59-15.04) release from military service. These odds ratios for anxiety symptoms were 3.1 (95% CI 2.11-4.64) and 4.1 (95% CI 2.80-5.94), respectively. Both depressive (OR = 5.7; 95% CI 3.88-11.20) and anxiety symptoms (OR = 3.2; 95% CI 2.47-4.17) were associated also with self-reported social-communicative difficulties.

Self-reported depressive and anxiety symptoms were associated with release from service as well as with social-communicative difficulties in young men. The early-onset mental health problems in young men seem to manifest itself at call-up as being unfit for the military service. Screening symptoms of depression and anxiety with self-reported scales defined those with mild, moderate or severe symptoms at risk for release from service.

KEYWORDS

Depression, Anxiety, Military Fitness, Social Communication, Conscript

INTRODUCTION

Mental health disorders were the leading cause of Years Lived with Disability (YLDs) , accounting for 17.2% of the total YLD in 2019 (IHME, 2022). In the ages of 15-to-24, major depression was the second leading specific cause of YLDs in the ages of 15-to-24, and anxiety disorder was the eighth (GBD, 2022). The highest ranked mental health disorder under 15-year-olds were conduct disorder and anxiety disorder (GBD, 2022).

In Finland, 18.6% of 9-to-11-year-old boys reported problems related to mood in the last two weeks, whereas 18% reported at least mild anxiety symptoms (THL, 2023). Also, the prevalence of moderate or severe anxiety, and symptoms of depression has increased in the last 10 years among Finnish boys aged 14-19 (THL, 2023). Furthermore, child mental health problems have become more strongly associated with negative social, educational, and mental health outcomes in recent generations (Sellers et al., 2019).

Parental unemployment has found to increase the likelihood of recurrent psychosomatic symptoms among children and adolescents (Pedersen et al., 2005), and to be associated with decreased school grades of adolescents (Drydakis, 2023). One study found that adolescents living with single mother or father or with mother and stepfather had increased likelihood of presenting self-reported symptoms of depression and anxiety (Aasen Nilsen et al., 2018). In children and adolescents, language difficulties were found to associate with weaker academic performance at the age of 25 (Johnson et al., 2010).

In general, children with symptoms of depression and anxiety may often present difficulties in social-communicative skills (Brenne & Rimehaug, 2019) and language skills (Norbury et al., 2016). Both emotional problems and social difficulties were associated with pragmatic language difficulties at ages 7-16 in the United Kingdom (St Clair et al., 2011), whilst emotional problems at the ages 7-9 also predicted difficulties at the ages of 12-to-15 in Norwegian children (Helland et al., 2014). Further, formation of successful social relationships during childhood promoted the social development of the American children (Marton et al., 2005). Among British 24-year-olds with language and social-communicative difficulties, symptoms of depression and anxiety were more prevalent than in their age peers (Botting et al., 2016).

The neurocognitive development in childhood is crucial in the development of language and social skills (Chaddock et al., 2011; Chiat & Roy, 2008). Language skills (e.g. vocabulary, pronunciation, and pragmatic skills) are thought to contribute to social-communicative skills

(Hoff, 2013; Norbury, 2014), defined as understanding speakers' intentions through their verbal and non-verbal cues together while interpreting these cues in the social context (Norbury, 2014). Social-communicative skills, and child's ability e.g. to resolve conflicts are needed for overall social development (Marton et al., 2005).

In the fifth edition of Diagnostic and Statistical Manual of Mental Disorders (DSM-5) (American Psychiatric Association, 2013), social pragmatic communication disorder (SCD) is a new addition. The DSM-5 defines SCD as 'having persistent difficulties in the social use of verbal and non-verbal communication resulting in functional limitations in effective communication and social participation, not attributable to another neurological or medical condition, including mental disorders. Its prevalence in the population has been approximately 7-11 % (Ellis Weismer et al., 2021). The risk factors of SCD include male sex, family history of autism spectrum disorder, other communication disorders and specific language disorder (American Psychiatric Association, 2013; Ellis Weismer et al., 2021). The diagnosis of SCD happens usually at the age of 4-5 years old, and most common comorbidities of SCD include attention deficit hyperactivity disorder, behavioral problems and specific learning disorders (American Psychiatric Association, 2013).

The term 'social-communicative difficulties' has been used to describe difficulties in the pragmatic and social-communicative domains of the language. Depressive symptoms (Stengård et al., 2009) and social-communicative difficulties were related to increased likelihood for permanent and temporary release from the military service (Silvala, Yliherva, et al., 2023). Also, lower social skills were predictive for poor adjustment to the military service (Salo, 2008). Furthermore, low physical activity was associated with a higher likelihood of presenting difficulties in social-communicative skills (Silvala, Hurtig, et al., 2023).

In Finland, about 30 % of male conscripts released from military service were released due to mental or behavioural problems in 2006-2008 (Taanila et al., 2011) and in 2011 (Lehesjoki, 2018). Nevertheless, already at the age of eight, symptoms either of depression or conduct disorder in boys - evaluated by primary school teacher- were predictive for release from military service (Multimäki et al., 2008). Mental health problems may, however, manifest themselves first time when compulsory military service approaches. Thus, this time point is crucial in young man's life to prevent long-lasting adverse mental health outcomes.

Psychiatric disorder diagnosis has almost six-fold increased the risk for suicidal ideation among the Finnish conscripts either at the call-up or at the time of release (Appelqvist-Schmidlechner et al., 2011). Further, seeking medical advice due to mental health problems during the compulsory military service (in 1967-1996, three 10-year cohorts, followed up for 18-to-35 years) was associated with risk for premature disability retirement (Frilander et al., 2016) indicating their long-lasting adverse effects. Thus, early detection of poor mental health and its effective intervention are needed.

Finland differs from other countries with compulsory military service (Appelqvist-Schmidlechner et al., 2010). The Finnish compulsory military service consists of 6 to 12 months of training (Multimäki et al., 2008). At the age of 18, all male Finnish citizens attend an compulsory military call-up arranged by Finnish Defence Force (Sourander et al., 2005). Prior to this call-up, the general health of young men is evaluated in a medical examination (Multimäki et al., 2008; TTO, 2012). After the medical examination, the physician suggests if an individual is fit for service or released from the service either permanently or temporarily. Later at the call-up, the board determines the military fitness category (Multimäki et al., 2008; TTO, 2012). Fit for service is defined as the ability to complete military service without endangering oneself or others (TTO, 2012). A total of 80% of those determined as fit for service at the call-up, start their military service in two years and the rest before the age of 30 (Multimäki et al., 2005). About 75 % of a given male cohort completes the service (Appelqvist-Schmidlechner et al., 2010). Thus, the compulsory call-up offers a comprehensive sample of the entire young Finnish male cohort (Sourander et al., 2005).

In the International Classification of Diseases and Related Health Problems (ICD-10), mental and behavioural disorders are classified under codes F00-F99 (World Health Organization, 2016). The psychiatric diagnoses that lead to permanent release from the service include psychotic disorders, bipolar disorder, antisocial personality disorder and borderline personality disorder (Laukkala et al., 2013). In cases of several other mental and behavioural disorders, fitness for military service is determined based on the individual's current symptoms and functionality (Laukkala et al., 2013). For example, acute onset of anxiety or depressive symptoms may be adequate reason for temporary release (Laukkala et al., 2013). Regarding disorders of psychological development (F80-89), the Finnish Defence Forces instructions recommend evaluating fitness for military service to be based on the current symptoms and functionality. Although, the disorders of psychological development

(F80-89) include disorders of various skills (World Health Organization, 2016), the Finnish Defence Forces instructions groups all these disorders into one category (TTO, 2012).

Studies on the association between symptoms of depression and anxiety, and release from the military service at the call-up remain scarce. There are few studies about the association between mental health problems and social-communicative difficulties in young adults. The aim of this population-based study on Finnish young men was to investigate the associations of self-reported symptoms of depression and anxiety 1) to fitness for military service at call-up and 2) to self-reported social-communicative difficulties.

METHODS

Study Design

The Finnish Defence Forces arranges compulsory military call-ups for all Finnish 18-year-old male citizens. The study population in the 'Young Men in the North' project consists of 4,556 young men. At baseline in 2014, they were commanded to participate in the Finnish Defence Forces call-up in the regions of Northern Osthrobothnia, Kainuu or Lapland. Out of them, 2,614 (57.4%) agreed to participate in this cross-sectional study and filled the study questionnaire. At the time of data collection in 2014, the mean age of the men was 18.1 years (*SD* = 0.4, range = 17–23). The participants provided written informed consent for the study. Personal identity information was encrypted and replaced with identification codes to provide full anonymity. The study was conducted in accordance with the Declaration of Helsinki, was approved by the ethical committee of the Northern Ostrobothnia Hospital District in Oulu, Finland and research permission was granted from the Finnish Defence Forces' Defence Command.

Fitness for military service

Adequate fitness for service in Finland is defined in the instructions of the Finnish Defence Forces and are based on the diagnoses in the ICD–10 (World Health Organization, 2016). Fit for service is defined as the ability to complete military service without endangering oneself or others (TTO, 2012).

Before a call-up, comprehensive health of the call-up candidate is evaluated in a medical examination in the communal health care (Multimäki et al., 2008; TTO, 2012). Based on this medical examination, the physician suggests a military fitness category (i.e. fit for service or released from the military service) (Multimäki et al., 2008; TTO, 2012). At the call-up, the board (involving two military officers and one civilian) determines the military fitness category (Multimäki et al., 2008; TTO, 2012).

Young men are assigned to four different fitness categories (A, B, C, and E). Categories A and B are defined as fit for service. The conscripts in category B have a minor disability (e.g., reduced hearing) that limits the service slightly but is not an impediment (TTO, 2012). Category C is described as 'not healthy with a disease or disability that prevents the conscript from serving' (e.g., diabetes, severe depression) and thus leads to them being released permanently from the military service (TTO, 2012). Category E is described as 'not healthy with a disease or disability that prevents the conscript from serving temporarily (e.g. musculoskeletal injuries), and thus temporarily released from the military service (TTO, 2012). In the present study, categories A and B were combined and described as 'fit for service', category C as 'permanently released', and category E as 'temporarily released'. Decision for young men's fitness for military service was obtained from the call-up board during the call-up.

Questionnaire

The study questionnaire consisted of scales and questions on physical and mental health, physical activity, language skills, psychosocial well-being, life situation, education, and the use of health services. The participant's financial situation was evaluated by self-reported question: What is your financial situation? ('good', 'moderate' or 'poor').

Self-reported depressive symptoms were evaluated with Raitasalo's modification (R-BDI) (Kaltiala-Heino et al., 1999) of the Short Form of Beck Depression Inventory (BDI-SF) for the Finnish population. It has shown to have high validity when compared with (BDI-SF) (Kaltiala-Heino et al., 1999) and high reliability (Cronbach's alpha = 0.87) in Finnish boys (Kaltiala-Heino et al., 1999). The R-BDI consists of 13 questions, each with five response options scoring from 0-3 points (Kaltiala-Heino et al., 1999). The range of the total score of R-BDI is 0–39 with cut-offs as follows: 0–4 points: no or minimal, 5–7: mild, 8–15: moderate and 16–39: severe depressive symptoms (Kaltiala-Heino et al., 1999).

Self-reported anxiety symptoms were evaluated with the Generalized Anxiety Disorder 7-item scale (GAD-7) which is a screen for GAD (Spitzer et al., 2006). GAD-7 has been considered valid and useful tool for detecting generalized anxiety in Finnish people (Kujanpää et al., 2014), as well as shown high reliability (Cronbach's alpha = 0.91) in Finnish adolescents and young adults (Tiirikainen et al., 2019). Each question has four response options scoring from 0-3 points (Spitzer et al., 2006). The range of total score is 0–21 with cut-offs as follows: 0–4 points: minimal anxiety, 5–9: mild, 10–14: moderate and 15–21: severe anxiety (Spitzer et al., 2006).

Diagnostic criteria for SCD describe difficulties in understanding the indirect meanings of the language (e.g., humour or metaphors) as well as difficulties in sharing information or engaging in effective communication and an inability to change communication to match the situation that result in difficulties in social participation and relationships (American Psychiatric Association, 2013).

The total score of social-communicative difficulties was constructed from the following self-reported questions: 1) Do you have difficulties in understanding humour? ('yes', 'sometimes' or 'no'); 2) Do you have difficulties taking part in group discussion? ('yes', 'sometimes' or 'no'); and 3) 'Do you have difficulties taking part in bilateral conversation? ('yes', 'sometimes' or 'no'). These self-reports were designed according to the diagnostic criteria of SCD in the DSM-5 (American Psychiatric Association, 2013) using a reiterative process by content experts. According to content experts, these questions assessed the most essential social-communicative skills for adapting to the social environment of military service. The range of total score is 0-3 with the cut-off value between zero (not having difficulties) and one points (having difficulties).

Covariates

The covariates were parents' employment, subjects's grade point average, housing situation, and weekly attained recommended amount of moderate-to-vigorous physical activity (MVPA), which were chosen based on the previous study of Multimäki et al. (2005) investigating the predictive factors of fitness for military service.

Previously it has been shown that the MVPA is associated with a lower likelihood of being permanently or temporarily released from the military service and a higher likelihood of

presenting difficulties in social-communicative skills (Silvala, Hurtig, et al., 2023). MET minutes for light physical activity and moderate-to-vigorous physical activity were calculated by multiplying the amount of physical activity with the MET value (duration × frequency × MET value) (Suija et al., 2013). The participants were classified into two categories so that the cut-off for total level of MVPA was 150 minutes/week, which was based on the recommendation of (World Health Organization, 2020). The construction of the MVPA-variable is described in detail in our previous study (Suija et al., 2013; Tammelin, 2003).

Statistical Analysis

In the analysis, the total score for social-communicative difficulties was dichotomised by combining the options 'sometimes' and 'yes'. Thus, the cut-off value of separate social-communicative difficulties was determined between zero (not having difficulties) and one points (having difficulties). The Cronbach's alpha of the questions measuring social-communicative difficulties was 0.6 suggesting that the internal consistency of the measurements is not high, however the item-total correlations were acceptable (question 1: 0.636, question 2: 0.405, and question 3: 0.437).

Self-reported depressive symptoms were dichotomised for the multivariate logistic regression analyses. The cut-off value of R-BDI was determined between 4/5 points i.e. no or only minimal symptoms (0-4 points) vs. mild, moderate, or severe depressive symptoms (5-39 points), as it has been used also previously (Lampinen et al., 2000). Self-reported anxiety symptoms were dichotomised for the analyses with a cut-off point 4/5 i.e. minimal anxiety (0-4 points) vs. mild, moderate or severe anxiety (5-21 points), because it has been shown (Seo & Park, 2015) sum of sensitivity and specificity (Seo & Park, 2015).

We used cross-tabulation and Pearson's χ^2-test to analyse the differences between depressive symptoms (R-BDI) and anxiety symptoms (GAD-7) across fitness for military service (fit for service, permanently released or temporarily released) and the social-communicative difficulties (difficulties or no difficulties).

We used multivariable logistic regression to analyse differences in depressive and anxiety symptoms, by the 3-category fitness for military service, and dichotomous self-reported social-communicative skills. Fitness for military service and self-reported social-

communicative skills were used as a dependent variable whereas depressive and anxiety symptoms were used as independent variables. Fit for service, adequate social-communicative skills, no depressive symptoms and no anxiety symptoms were used as reference categories. The strength of the associations is presented by odds ratios (ORs) with 95% confidence interval (CI).

The multivariable logistic regression models were adjusted for covariates (parents' employment, subject's grade point average, housing situation, and MVPA). When studying mental health variables in respect for fitness for military service or social-communicative skills, the first adjusted model (model 1) included parents' employment, subjects's grade point average and housing situation. In the model 2, we included also MVPA in the model 1. The model-fit measures were used to assess the overall goodness of fit of crude model as well as models 1 and 2. Grade point average was considered statistically significant in the χ^2-test in model 1, and MVPA was considered statistically significant in the χ^2-test in model 2. When comparing the Cox and Snell's, and Nagelkerkes's R^2-tests between crude model, model 1 and 2, the highest values of R^2-tests were in the model 2, indicating the best fit.

We also conducted multivariate logistical regression analysis with same models to investigate the association of depressive and anxiety symptoms, and difficulties in social-communicative skills, however, in the analyses we used no or mild symptoms as reference categories.

We conducted all the analyses using IBM SPSS Statistics (Version 26). A p value <.05 was considered statistically significant.

RESULTS

Table 1 presents the characteristics of the young men according to the categories of fitness for military service at call-up. Most of them were 18 years old at the time of call-up, but permanently and temporarily released men were older. Men who were considered fit for service had completed high school and reported good financial situation more often. Nearly 30% of the men who were permanently or temporarily released from the military service had at least one parent unemployed, whereas for those who were considered fit for service, the figure was 20 %. The same applies to living with both parents. Permanently and temporarily released men differed significantly from those who were considered fit for service in respect

to all the studied characteristics. Also, permanently released men were older than temporarily released men. However, temporarily released men had more often either completed only comprehensive school or vocational school than permanently released men.

Table 1. Demographics of the young Finnish men (n = 2614) by three category fitness for military service at call-up.

(n = 2614) [a]							
	Fit for service (n, %)	Permanently released (n, %)	Temporarily released (n, %)	Total (n, %)	P-value*		
					Fit for service vs. Permanently release	Fit for service vs. Temporarily released	Permanently released vs. Temporarily released
Age							
17-18	2202 (98,2)	129 (69,0)	162 (89,0)	2493 (95,4)	**< 0,001**	**< 0,001**	**< 0,001**
19-20	36 (1,6)	42 (22,5)	18 (9,8)	96 (3,7)	**< 0,001**	**< 0,001**	**< 0,001**
Over 20	4 (0,1)	19 (8,5)	2 (1,0)	22 (0,9)	**< 0,001**	**< 0,001**	**< 0,001**
Education							
Comprehensive school	232 (10,4)	29 (15,7)	34 (18,8)	295 (11,3)	**< 0,001**	**< 0,001**	**0,010**
High school	951 (42,5)	54 (29,2)	44 (24,3)	1049 (40,3)	**< 0,001**	**< 0,001**	**0,010**
Vocational school	1048 (46,8)	86 (46,5)	100 (55,2)	1234 (47,4)	**< 0,001**	**< 0,001**	**0,010**
Higher education	6 (0,3)	16 (8,6)	3 (1,7)	25 (1,0)	**< 0,001**	**< 0,001**	**0,010**
Marital status							
Single	1601 (71,7)	143 (76,9)	128 (70,7)	1872 (72,0)	**< 0,001**	**< 0,001**	0,405
Relationship	589 (26,4)	33 (17,7)	41 (22,7)	663 (25,5)	**< 0,001**	**< 0,001**	0,405
Marriage / domestic partnership	42 (1,9)	10 (5,4)	12 (6,6)	64 (2,5)	**< 0,001**	**< 0,001**	0,405
Financial situation							
Good	1087 (48,8)	65 (35,1)	48 (26,5)	1200 (46,2)	**< 0,001**	**< 0,001**	0,054
Moderate	1040 (46,7)	101 (54,6)	101 (55,8)	1240 (47,9)	**< 0,001**	**< 0,001**	0,054
Poor	102 (4,6)	19 (10,3)	32 (17,7)	153 (5,9)	**< 0,001**	**< 0,001**	0,054
Parents' employment							
Both or one unemployed	402 (20,5)	44 (28,8)	43 (28,1)	489 (21,6)	**0,016**	**0,027**	0,899
Both employed	1557 (79,5)	109 (71,2)	110 (71,9)	1776 (78,4)	**0,016**	**0,027**	0,899
Subject's grade point average							
Below 7.5	684 (32,4)	72 (42,4)	83 (50,3)	839 (34,3)	**0,008**	**< 0,001**	0,145
7.5 or over	1424 (67,6)	98 (57,6)	82 (49,7)	1604 (65,7)	**0,008**	**< 0,001**	0,145

Housing situation							
With mother and father	1808 (82,6)	129 (61,6)	128 (71,3)	2065 (79,7)	**< 0,001**	**< 0,001**	0,053
Other	419 (17,4)	55 (38,4)	52 (28,7)	526 (20,3)	**< 0,001**	**< 0,001**	0,053
Weekly physical activity[b]							
Less than 150 minutes	588 (28,0)	101 (59,4)	92 (55,1)	781 (32,0)	**< 0,001**	**< 0,001**	0,423
150 minutes or more	1512 (72,0)	69 (40,6)	75 (44,9)	1656 (68,0)	**< 0,001**	**< 0,001**	0,423

[a]Numbers do not match due to missing values.
[b]Weekly attained moderate-to-vigorous physical activity (MVPA).
*The P-value has been calculated using Pearson's χ^2-test. None of the cells have expected count less than 5.

Associations of Self-reported Symptoms of Depression and Anxiety to Fitness for Military Service at Call-Up

Table 2 presents the association of self-reported depressive and anxiety symptoms with fitness for military service at call-up. Both permanently and temporarily released young men reported statistically significantly more depressive symptoms, and anxiety symptoms than those who were considered fit for service but did not differ from each other.

Table 2. Self-reported depressive and anxiety symptoms of the young Finnish men at call-up by three category fitness for military service (n = 2614).

(n = 2614)[a]	**Fitness for military service**						
	Fit for service (n, %)	Permanently released (n, %)	Temporarily released (n, %)	Total (n, %)	P-value*		
					Fit for service vs. Permanently release	Fit for service vs. Temporarily released	Permanently released vs. Temporarily released
Depressive symptoms[b]							
No symptoms or only minimal	2126 (97,0)	141 (79,7)	131 (75,7)	2398 (94,3)	**< 0,001**	**< 0,001**	0,439
Mild	44 (2,0)	16 (9,0)	16 (9,2)	76 (3,0)	**< 0,001**	**< 0,001**	0,439
Moderate	21 (1,0)	11 (6,2)	19 (11,0)	51 (2,0)	**< 0,001**	**< 0,001**	0,439
Severe	1 (0,0)	9 (5,1)	7 (4,0)	17 (0,7)	**< 0,001**	**< 0,001**	0,439
Anxiety symptoms[c]							
No symptoms or only minimal	1863 (87,5)	118 (66,7)	106 (60,2)	2087 (84,1)	**< 0,001**	**< 0,001**	0,207
Mild	216 (10,1)	32 (18,1)	48 (27,3)	296 (11,9)	**< 0,001**	**< 0,001**	0,207

Moderate	43 (2,0)	18 (10,2)	16 (9,1)	77 (3,1)	**< 0,001**	**< 0,001**	0,207
Severe	8 (0,4)	9 (5,1)	6 (3,4)	23 (0,9)	**< 0,001**	**< 0,001**	0,207

[a]Numbers do not match due to missing values.
[b]Raitasalo's modification of the Short Form of Beck Depression Inventory (R-BDI)
[c]Generalized Anxiety Disorder 7-item scale (GAD-7)
*The P-value has been calculated using Pearson's χ^2-test. None of the cells have expected count less than 5.

Table 3 presents the crude and adjusted associations of self-reported at least mild depressive or anxiety symptoms (both with two categories) with fitness for military service at call-up. Both were statistically significantly associated with a higher likelihood to be either permanently or temporarily released from service, but depressive symptoms had about two-fold higher odds ratios. Adjustments did not change this pattern.

Table 3. Self-reported depressive and anxiety symptoms of young Finnish men (n = 2614) at call-up by three category fitness for military service in multivariate logistic regression analysis. Fit for service, no depressive symptoms and no anxiety symptoms were used as reference categories.

(n = 2614)[a]	**Fitness for military service**											
	Permanently released						Temporarily released					
	Crude		Model 1[a]		Model 2[b]		Crude		Model 1[a]		Model 2[b]	
	OR (95 % CI)	P-value*	OR (95% CI)	P-value*	OR (95% CI)	P-value*	OR (95% CI)	P-value*	OR (95% CI)	P-value*	OR (95 % CI)	P-value*
Depressive symptoms[c]												
Mild, moderate or severe symptoms	8,2 (5,30-12,8)	**< 0,001**	6,6 (3,88-11,2)	**< 0,001**	4,2 (2,38-7,44)	**< 0,001**	10,3 (6,75-15,8)	**< 0,001**	9,2 (5,59-15,0)	**< 0,001**	7,0 (4,13-11,8)	**< 0,001**
Anxiety symptoms[d]												
Mild, moderate or severe symptoms	3,5 (2,49-4,89)	**< 0,001**	3,1 (2,11-4,64)	**< 0,001**	2,5 (1,63-3,80)	**< 0,001**	4,6 (3,32-6,40)	**< 0,001**	4,1 (2,80-5,94)	**< 0,001**	3,6 (2,42-5,36)	**< 0,001**

*A p value <.05 was considered statistically significant.
[a]Model 1 confounding factors: parents' employment, subject's grade point average, and housing situation.
[b]Model 2 confounding factors: Model 1 + weekly attained recommended amount of moderate-to-vigorous physical activity (MVPA).
[c]Raitasalo's modification of the Short Form of Beck Depression Inventory (R-BDI)
[d]Generalized Anxiety Disorder 7-item scale (GAD-7)

Associations of Self-Reported Symptoms of Depression and Anxiety Social-Communicative Difficulties

Table 4 presents the associations of self-reported depressive and anxiety symptoms with social-communicative skills. The young men reporting difficulties social-communicative skills reported also more often symptoms of depression and anxiety than those without these difficulties.

Table 4. Self-reported depressive and anxiety symptoms of young Finnish men by two category self-reported social-communicative skills (n = 2614).

(n = 2614)[a]	**Difficulties in social-communicative skills**[b]			
	No (n, %)	Yes (n, %)	Total (n, %)	P-value*
Depressive symptoms[c]				
No symptoms or minimal	1778 (97,0)	506 (86,2)	2284 (94,4)	**< 0,001**
Mild	38 (2,1)	37 (6,3)	75 (3,1)	**< 0,001**
Moderate	11 (0,6)	33 (5,6)	44 (1,8)	**< 0,001**
Severe	6 (0,3)	11 (1,9)	17 (0,7)	**< 0,001**
Anxiety symptoms[d]				
No symptoms or minimal	1581 (88,5)	405 (71,1)	1986 (84,3)	**< 0,001**
Mild	166 (9,3)	114 (20,0)	280 (11,9)	**< 0,001**
Moderate	29 (1,6)	41 (7,2)	70 (3,0)	**< 0,001**
Severe	11 (0,6)	10 (1,8)	21 (0,9)	**< 0,001**

[a]Numbers do not match due to missing values.
[b]Social-communicative skills: having vs. not having difficulties.
[c]Raitasalo's modification of the Short Form of Beck Depression Inventory (R-BDI)
[d]Generalized Anxiety Disorder 7-item scale (GAD-7)
*The P-value has been calculated using Pearson's χ^2-test. None of the cells have expected count less than 5.

Table 5 presents the crude and adjusted associations of self-reported at least mild depressive or generalized anxiety symptoms by difficulties social-communicative skills. Both were statistically significantly associated with a higher likelihood of reporting social-communicative difficulties but depressive symptoms had about two-fold higher odds ratios. Adjustments did not change this pattern.

Table 5. Self-reported depressive and anxiety symptoms of young Finnish men (n = 2614) by two category self-reported social-communicative skills in multivariate logistic regression analysis. Adequate social-communicative skills, no depressive symptoms and no anxiety symptoms were used as reference categories.

(n = 2614)[a]	**Difficulties in social-communicative skills**		
	Yes		
	Crude	Model 1[a]	Model 2[b]

	OR (95% CI)	P-value*	OR (95% CI)	P-value*		P-value*
Depressive symptoms[c]						
Mild, moderate or severe symptoms	5,2 (3,62-7,39)	**< 0,001**	5,7 (3,79-8,72)	**< 0,001**	4,6 (3,00-7,16)	**< 0,001**
Anxiety symptoms[d]						
Mild, moderate or severe symptoms	3,1 (2,48-3,94)	**< 0,001**	3,2 (2,47-4,17)	**< 0,001**	3,0 (2,32-3,99)	**< 0,001**

*A p value <.05 was considered statistically significant.
[a]Model 1 confounding factors: parents' employment, subject's grade point average, and housing situation.
[b]Model 2 confounding factors: Model 1 + weekly attained recommended amount of moderate-to-vigorous physical activity (MVPA).
[c]Raitasalo's modification of the Short Form of Beck Depression Inventory (R-BDI)
[d]Generalized Anxiety Disorder 7-item scale (GAD-7)

In the analyses with no or mild symptoms as reference categories, moderate or severe depressive symptoms statistically significantly increased the likelihood of reporting social-communicative difficulties (Model 1: OR = 10.9, 95% CI = 5.5-21.7, $p < 0.001$, and Model 2: OR = 7.8, 95% CI = 3.9-15.8, $p < 0.001$). Similar trend was observed when moderate or severe anxiety symptoms were compared with no or mild anxiety symptoms (Model 1: OR = 5.6, 95% CI = 3.3-9.6, $p < 0.001$, and Model 2: OR = 4.6, 95% CI =2.6-8.0, $p < 0.001$).

DISCUSSION

In this population-based study among young Finnish men, we investigated the associations of self-reported symptoms of depression and generalized anxiety with fitness for military service at call-up and with self-reported social-communicative difficulties. It showed that self-reported depressive symptoms and anxiety symptoms were associated with increased likelihood of being permanently or temporarily released from the service as well as with self-reported social-communicative difficulties. Thus, young men's simple self-reports on mental problems and social-communicative difficulties can be valuable when assessing fitness for military service.

Our study population seems to be representative of the general young male Finnish population. For example, approximately 77% of Finnish men completed either high school or vocational school in 2014 (Statistics Finland, 2024a), and the percentages of completing high school or vocational school were approximately 87%. In both the general population and our study sample, approximately 2.5% of men aged 18-24 in Finland were married in 2014 (Statistics Finland, 2024b). In 2014, approximately 66% of the men aged 18-24 were not at risk for poverty or marginalization (Statistics Finland, 2024c). In our study sample

about 94% of the men reported their financial situation either moderate or good, which seems to differ from the general population.

Mild difficulties - meaning only slightly impaired function - due to a disorder of psychological development, such as social-communicative difficulties, are not adequate reason for release from the service (TTO, 2012). However, all the disorders of psychological development (F80-89) are grouped as one category in the Medical Examination Guide (TTO, 2012), and the Guide is based on the diagnoses in the ICD–10 that does not contain diagnostical criteria for SCD (World Health Organization, 2016). The results of this study and our previous studies (Silvala, Hurtig, et al., 2023; Silvala, Yliherva, et al., 2023) are the first studies showing the association of social-communicative difficulties and fitness for military service. The evaluation of screening tools for social-communicative difficulties in the context of military fitness requires further investigation.

The best interest of the Finnish Defence Forces is to detect and determine early and effectively who is fit for service. Therefore, collaboration in monitoring conscripts and research on issues that require potential intervention are needed. Based on our study, we emphasise the need for better understanding of the broad scale effects of difficulties in both social-communicative skills and mental health problems in young men, as well as need for finding indicators for being unfit for the military service. (Statistics Finland, 2024a)(Statistics Finland, 2024b)(Statistics Finland, 2024c)

Associations of Self-reported Symptoms of Depression and Anxiety to Fitness for Military Service at Call-Up

Our results appear to be in line with a previous study (Stengård et al., 2009) showing that depressive symptoms were more prevalent among permanently and temporarily released men, however, in the previous study the study population consisted of conscripts that had already started their service, unlike the study population in our study. Also, in our study the permanently and temporarily released groups did not differ from each other in the context of the prevalence of depressive and anxiety symptoms. Also, another study has suggested that mental health problems increased the likelihood for being released from the service, but their study population consisted of conscripts that had already started their military service as well (Salo, 2008).

Associations of Self-Reported Symptoms of Depression and Anxiety Social-Communicative Difficulties

Previous studies (Brenne & Rimehaug, 2019; Conti-Ramsden & Botting, 2004; Cross, 2011; Helland & Heimann, 2007) have shown that depressive and anxiety symptoms are associated with social-communicative difficulties. However, these studies investigated these associations in children, whereas we focused on young men. To our knowledge, the present study is one of the few studies investigating these associations in young men.

We have reported previously that self-reported social-communicative difficulties increase the likelihood of being released from the service (Silvala, Yliherva, et al., 2023). However, some young men considered fit for service presented also social-communicative difficulties (Silvala, Yliherva, et al., 2023). Similarly, in the present study we noticed that 10% of the men considered fit for service reported, however, symptoms of mild generalized anxiety, whereas only 3% reported at least mild depressive symptoms. Thus, further research is needed to assess how men with mild mental health problems, especially those with anxiety, succeeded in the military service.

We also found that moderate or severe symptoms of depression and anxiety (vs. no or mild symptoms) increased the likelihood for reporting difficulties in social-communicative skills even more than mild, moderate or severe symptoms (vs. no symptoms). Thus, our results with reference categories being ‘no symptoms’ are conservative, which should be acknowledge. However, future research is needed.

Strengths and Limitations

This study has several strengths. The first is that because the military call-up in Finland is mandatory for all young Finnish men, we had a comprehensive sample of them. The response rate was quite high (57.4%) (Baruch, 1999). Secondly, given that young people’s mental disorders often predict the same or worse conditions in adulthood, the time of military call-up is important for early detection, intervention and prevention of poor mental health outcomes of young men i.e. one of the core health challenges of the current time. Thus, our study is a step further in this less studied area. The third strength relates to the fitness categories and how they can be considered as a useful general indicator of the overall good

health of the male population (Multimäki et al., 2005). The fourth strength was that our results were given by easily administered self-reports, which were accepted by the young men and available for further research. Self-reports have been considered stable and valid measure in the physical and emotional dimensions of adolescents and young adults (Fosse & Haas, 2009) and can be recommended for use in population studies (Jylhä et al., 2006).

There remain some limitations to this study. We were unable to assess differences among those who participated in the study (57.4%) and those who did not (42.6%). Thus, our study population may not represent the population as a whole. It is possible that some of the men who presented difficulties in language and social-communicative skills did not complete the study questionnaire because they may have found it burdensome. Thus, our result in this respect can be conservative.

To our knowledge, there are no screening tools for social-communicative difficulties. While a valid and reliable instrument is still called for, we measured social-communicative difficulties with only limited number of items, but the content experts selected questions that assessed the most essential social-communicative skills for adapting to the social environment of military service. However, social-communicative difficulties were not measured with an instrument with good psychometric properties. Thus, the findings should be interpreted with an abundance of caution. We determined the cut-off value for social-communicative difficulties between zero (no difficulties) and one points (difficulties) by combining the options ‘sometimes’ and ‘yes’ which may have resulted in losing some of the differences between the groups. In some of the multivariate logistic regression analyses, the proportion of men with some of the traits measured was quite small, decreasing the power of these analyses.

Conclusion

Our study highlights the burden of mental health problems of young men that may manifest as being unfit for military service at call-up. According to the results of the study, medical examination during the call-up process seems to identify existing mental health problems and adequately screen new problems. However, validated self-report mental health questionnaires, such as R-BDI and GAD-7, could be used as part of the questionnaire before the medical examinations as an adjunctive screening tool for undiagnosed mental health problems. Early support for social-communicative skills and assessment and promotion of

mental health in boys and male adolescents is crucial for intervening this adverse process. Further research is needed, as well as valid and reliable screening tools for social-communicative difficulties, especially when assessing fitness for compulsory military service. Longitudinal studies are needed to assess how men with social-communicative difficulties and mild mental health problems succeed in the military service, and to when assess the reciprocal associations between social-communicative difficulties and symptoms of depression or anxiety.

ACKNOWLEDGEMENTS

Ethics Approval Statement

The study was conducted in accordance with the Declaration of Helsinki and was approved by the ethical committee of the Northern Ostrobothnia Hospital District in Oulu, Finland (approval ID: EETTMK: 37/2014). Research permission was granted from the Finnish Defence Forces' Defence Command AK8233 (23.4.2014), AN11380 (20.6.2017) and AU12646 (10.5.2024). Participants gave written informed consent to participate in the study before taking part.

Data Availability Statement

No data are available.

Funding Statement

The project was funded by the Finnish Defence Forces' Joint Healthcare and the Scientific Advisory Board for Defence (MATINE). JS has been supported by working grants from the Alma and KA Snellman Foundation, Oulu, Finland (20230008), the Finnish Psychiatric Association and from the University of Oulu Scholarship Foundation (20240061). HKH has been supported by Päivikki and Sakari Sohlberg Foundation (230035), and Signe and Ane Gyllenberg Foundation (6671).

DECLARATION OF INTEREST STATEMENT

Authors have no conflict of interest to declare.

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