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BMJ Open Association between university students' two-staged health screening and student health care utilisation: register based observational study

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ABSTRACT

Objectives The aim of this study was to explore how university students' participation in a two-staged health screening at the beginning of university studies associates with student health care utilisation in a 6-year follow-up.

Design Nationwide, observational, register-based cohort study with a 6-year follow-up.

Setting Student health care in Finland. Finnish Student Health Service (FSHS) provides statutory student health services to university students in Finland. The two-staged health screening of FSHS includes the electronic health questionnaire (eHQ) provided annually to university entrants and a subsequent health check, when necessary, based on students eHQ response.

Participants A national cohort of university entrants from the 2011–2012 academic year (N=15 723) was assessed. After exclusions the study population consisted of 12 972 students, n (female)=7368, n (male)=5604.

Outcome measures The primary outcome measures were students' health service utilisation pattern obtained by clustering analyses method and the students' participation in different stages of the health examination process.

Results Four distinguishable health care utilisation patterns were identified: (1) constant low use, (2) constant high use, (3) increasing use and (4) decreasing use. The students' OR for belonging to the constant high use group was significantly higher among females (OR 4.0, 95% CI 3.5 to 4.6) and students who attended the health check (OR 4.7, 95% CI 3.9 to 5.6).

Conclusions Participating in the two-staged health screening was associated with increase in health care utilisation. The process detects students with health problems.

INTRODUCTION

Health checks are an established part of preventive healthcare services in several countries. Previous studies have reported contradictory results regarding the effects of health checks on subsequent healthcare utilisation.^{1–3} In two review studies, general health checks were found to increase medical diagnoses and, therefore, to be associated with

STRENGTHS AND LIMITATIONS OF THIS STUDY

- ⇒ This was the first study to report the association of a two-staged health screening at the beginning of studies and consequent student health care utilisation.
- ⇒ The greatest strength of the study was the nationwide student health care utilisation register data, which enabled the assessment of the student health care contacts and reasons for encounters for the whole national cohort of university entrants.
- ⇒ The main limitation was that the service utilisation data covered only student health care, no other primary health care contacts, and therefore covered approximately 80% of the total primary care service use.
- ⇒ The study was conducted in a real-life setting and, therefore, the compared health examination process groups could not be matched.

elevated healthcare service utilisation.^{4 5} A study with relatively long follow-up reported elevation in outpatient physician utilisation after health screening which, however, was no longer apparent after 7 years.⁶ Another study reported the same trend in hospital admission during an 8-year follow-up.⁷ However, none of these studies were conducted in student populations.

Most university entrants are young adults, approximately the age of 18–26. Young adulthood is biologically, and psychologically a particular phase which affects the decision making and behaviour of university entrants.⁸ The onset of several mental health disorders occurs in young adulthood.⁹ Students in higher education seem to have more mental health issues than their non-student peers, which has raised concerns.^{10–12} These facts may significantly influence the healthcare service needs and utilisation of higher education students.^{13–15}

Statutory student healthcare services of Finnish university students, including health checks and medical care, are provided nationwide by the Finnish Student Health Service (FSHS).^{16 17} The basis of the preventative work in the FSHS is a two-staged health screening process, which includes an electronic Health Questionnaire (eHQ) provided to all university entrants and a subsequent health check, when necessary, based on the students' eHQ responses.^{18 19}

Previous research on university students' healthcare service utilisation is limited,²⁰ even though there are studies focusing on school-based healthcare of adolescents, not yet in universities.²¹ Most research studying the effect of health checks on healthcare utilisation has focused on hospitalisations and very few have been conducted in the primary care context. Further, the previous studies have been conducted mostly in older non-student populations.²²

The objective of this study was to explore how university students' participation in a two-staged health screening during the first year of studies associates with student healthcare utilisation in a 6-year follow-up. To our knowledge, this is the first study to research the effect of health screening on health service utilisation in a student population.

METHODS

This was a nationwide register-based cohort study with a 6-year follow-up. The study design has been described in detail previously.¹⁸ The study was conducted in a real-life setting and used the register data that the FSHS produced regarding its health examination process and other services. The population was the national cohort of university entrants from the 2011–2012 academic year in Finland (n=15 723). The final study population in the analyses consisted of 12 972 students after exclusions (figure 1, online supplemental file 1). We used the the Strengthening the Reporting of Observational Studies in Epidemiology cohort checklist (2007 (V.4)) when writing our report.²³

The health screening process of FSHS

The FSHS's statutory ongoing two-staged health screening process was designed in 2008 to identify and support students at risk for decreased study ability.^{18 19} The first stage, the eHQ, included 26 questions about health, social relations and studying (online supplemental file 2). The eHQ responses were evaluated by public health nurses. The second stage was determined based on the students' eHQ responses. A nurse recommended to the student one of the following interventions: (1) referral to a face-to-face health check conducted by a public health nurse, (2) referral to an appointment other than a health check, for example, physiotherapy or (3) in case of no need for other interventions, an electronic message to the student to support a healthy lifestyle (figure 1). The interpretation of the eHQ relied mainly on nurses'

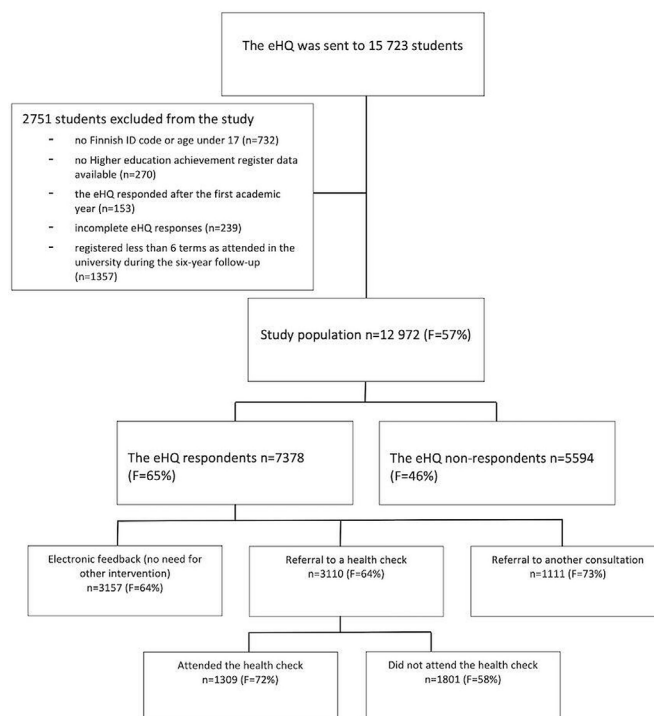


Figure 1 Students' participation in the health examination process and the proportions of the females (F) in parenthesis in each step of the health examination process. The exclusion criteria of the study are listed. eHQ, electronic Health Questionnaire.

professional competence. In the eHQ 17 questions had alarm signals that were created to draw nurses' attention to critical responses.

The health check for students screened by the eHQ was a general health check. No laboratory tests or imaging were routinely involved. Participation in the health examination process was voluntary and free of charge for students. The health checks were conducted at all 13 FSHS service units around Finland.

Healthcare contacts and reasons for encounter

Finland has a national coding system for the different types of healthcare contacts such as appointments (live or via video consultation), telephone consultations, and remote contacts (eg, text message).²⁴ In the study, the term 'contact' refers to all of these different types of contacts. Healthcare professionals in the FSHS were routinely instructed to code the reason for encounter for all contacts by using either the International Classification of Diseases (ICD-10) or International Classification of Primary Care (ICPC-2). The reason for the encounter was coded in 90% of the contacts. Contacts with a missing reason for the encounter were included in the analyses and formed the 'missing data' group. This study included the primary code of the contact, and all ICD-10 codes and ICPC-2 codes were converted to ICPC-2 chapter codes.²⁵ There were 20 contacts where the reason for the encounter could not be recoded, and they were counted as missing.

Data

The information about students' participation in the health screening process and the student healthcare utilisation data were collected from the eHQ register and electronic medical records of the FSHS. The data included student healthcare contacts excluding dental care, of the study population from 1 August 2011 to 31 July 2017. The data were linked by using Finnish personal identity codes.²⁶ All Finnish citizens and permanent residents have personal identity codes, which enables data linkage between the registers and individual-level analyses.²⁷ The information about the sex of the students was based on the personal identity codes. Age was categorised as in the Eurostudent study and in the Finnish University Students' Health Survey as follows: 17–21 years, 22–24 years, 25–29 years and 30 years or older.^{28 29}

The eHQ data included register-based information about the students' faculty of study (department in a university for example, medical faculty). For the statistical analyses, the faculties were categorised to form the variable 'field of study'. The categorisation was based on the classification used in the Finnish University Students' Health Survey and was in accordance with the field of studies listed by the Ministry of Education and Culture.^{29 30} Faculties were categorised as 'other' when they could be included in more than one category.

A variable 'health examination process group' included five categories based on the student's participation and how they were directed by the public health nurse in the health examination process: (1) did not respond to the eHQ; (2) electronic feedback; (3) referral to a health check, did not attend; (4) referral to a health check, attended and (5) referral to another consultation.

Statistical analysis

To describe the data, the frequencies and percentages of each variable were calculated. χ^2 tests were employed to detect associations between the categorical variables. In cases with continuous non-normally distributed data, the Kruskal-Wallis H-test was used to detect the differences between groups and the pairwise comparisons were performed using Bonferroni correction.

For identifying the various patterns of how students use the student healthcare services, hierarchical clustering was used.³¹ The number of uses were determined at the term-based level (12 terms=6 academic years). In those cases where the individual was not registered as present for some of the terms at the university, the service use was coded as missing information. Individuals present for less than six terms (ie, 3 years) (n=1357) were omitted from the analysis due to the large number of missing values. Additionally, the individuals who did not use the services at all were omitted (n=2181). Hence, 10 791 individuals were included in the hierarchical cluster analysis which can be explained as follows: First, all the service uses were logarithmically transformed and the pairwise dissimilarities were computed with Euclidean distance. Second, based on the computed distance, the subjects were

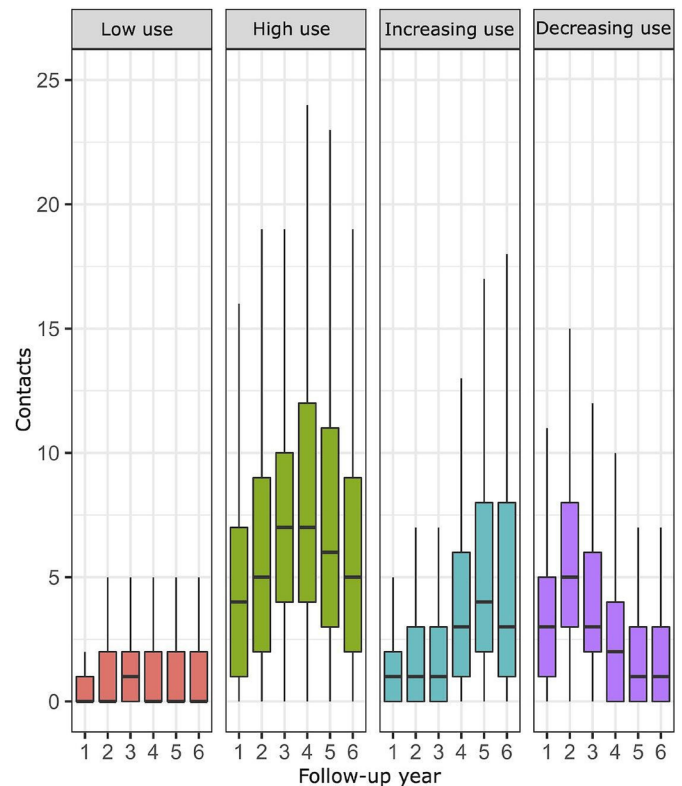


Figure 2 The number of contacts by students within each healthcare service utilisation pattern obtained by clustering analysis. The follow-up time was six academic years in total. In addition, the students who did not use services at all formed the NO service use group (n=2181). Number of students in each pattern: n (low use)=5723, n (high use)=2053, n (increasing use)=1592, n (decreasing use)=1423.

grouped into a hierarchical cluster tree by using the Ward linkage method (minimum variance method). Thus, the subjects with a small distance (i.e. similar service use pattern) are located in proximity in the hierarchical tree. Third, the tree was cut into the clusters, which revealed the different patterns of service use shown in figure 2.

The data were analysed with a multinomial logistic regression model to detect different health examination process groups that were statistically associated with the detected health service utilisation patterns identified with the cluster analysis. First, univariate models were created for each predictor separately. Further, the model was adjusted by using multivariable logistic regression, with which we computed the adjusted ORs that had been adjusted for other covariates, including possible confounders. Both unadjusted and adjusted ORs with 95% CI were computed. In all statistical analyses, $p < 0.05$ were considered to be statistically significant.

All statistical analyses were carried out using IBM SPSS Statistics for Windows, V.26 (IBM) and R V.3.6.1 (The R Foundation), with package cluster used in clustering and ggplot2 used in result visualisation.^{32–34}

Patient and public involvement

There was no patient or public involvement.

Table 1 The demographics of the study population (n=12 972) by health service use group

	No use n=2181 n (%)	Low use n=5723 n (%)	High use n=2053 n (%)	Increasing use n=1592 n (%)	Decreasing use n=1423 n (%)	P value
Sex						<0.001
Females	841 (11)	2832 (38)	1669 (23)	1032 (14)	994 (14)	
Males	1340 (24)	2891 (52)	384 (7)	560 (10)	429 (8)	
Age at the enrolment						<0.001
17–21	1085 (12)	4037 (46)	1516 (17)	1145 (13)	956 (11)	
22–24	232 (14)	781 (46)	274 (16)	213 (13)	208 (12)	
25–29	286 (22)	534 (40)	186 (14)	150 (11)	168 (13)	
≥30	578 (48)	371 (31)	77 (6)	84 (7)	91 (8)	
Field of study						<0.001
Natural sciences, agriculture and forestry, and pharmacy	356 (18)	876 (45)	279 (14)	245 (13)	178 (10)	
Technology and engineering	511 (20)	1237 (48)	306 (12)	276 (11)	272 (11)	
Business and economics	297 (22)	634 (48)	122 (9)	156 (12)	121 (9)	
Social sciences	240 (18)	566 (41)	240 (18)	179 (13)	150 (11)	
Other	94 (17)	272 (49)	83 (15)	59 (11)	51 (9)	
Sports science, educational sciences, health sciences, psychology	284 (17)	707 (41)	305 (18)	214 (13)	200 (12)	
Humanities, theology, philosophy	225 (11)	834 (41)	445 (22)	291 (14)	235 (12)	
Law	60 (15)	182 (46)	57 (14)	49 (12)	50 (13)	
Arts	62 (12)	221 (44)	111 (21)	67 (13)	71 (13)	
Medicine	52 (11)	194 (40)	105 (22)	56 (12)	78 (16)	

P values resulting from χ^2 tests describe statistical difference between health service use groups obtained by the clustering method. Groups, excluding the NO use group, were based on the clustering of healthcare utilisation patterns for each student.

RESULTS

Of the study population (n=12 972) 83% had used student healthcare services at least once during the 6-year follow-up and total of 184 786 contacts with the FSHS were registered. Females made 73% of the contacts which was significantly higher compared with male ($p<0.001$). Of all contacts 74% were face-to-face appointments. The most common reason for an encounter was psychological (ICPC chapter P), which accounted for 22% of the contacts. ICPC chapter code P was coded at least once as the primary reason for an encounter for 25% of students (n=3300) during the 6-year follow-up.

Of the students 2181 (17%) did not use FSHS services during the follow-up and therefore formed the 'no service use' group and healthcare utilisation patterns of 10 791 students (61% females) were identified with cluster analyses. The demographics of students in each cluster and in no service use group are presented in [table 1](#).

In the selected four-cluster solution, the most common (53% of students) healthcare utilisation pattern included the students who consistently had a low number of contacts over the study follow-up time (low use group). The second largest (19%) cluster included students who consistently had a high number of contacts (high use group). The third largest cluster (15%) included students whose service utilisation increased during the follow-up time (increasing use group). The smallest cluster (13%) included students whose service utilisation decreased towards the end of the follow-up time (decreasing use group) (see [figure 2](#)).

The median number of contacts during the 6-year follow-up was 6 (IQR 3–10) in low use group, 36 (IQR 26–51) in high use group, 15 (IQR 9–23) in increasing use group and 18 (IQR 12–24) in decreasing use group. Post hoc comparisons showed that all the pairwise comparisons were statistically significant ($p<0.001$).

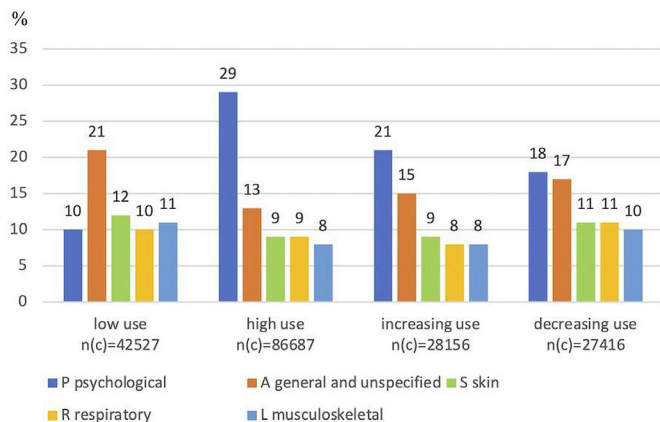


Figure 3 The distributions of the five most common ICPC-2 chapter codes (reasons for encounter) by the health service use groups counted from the total number of contacts (n(c)). The distributions of ICPC-2 chapter codes were statistically significantly different between the groups (p<0.001). The number of students in each group: n(low use)=5723, n(high use)=2053, n(increasing use)=1592, n(decreasing use)=1423. ICPC-2, International Classification of Primary Care.

The five most common reasons for an encounter were the same in all service utilisation groups and included 60%–70% of all contacts (figure 3). In the low use group, general and unspecified reasons (ICPC-A) were the most common reason for the encounter. In all other groups, psychological reasons (ICPC-P) were the most common reason. The mean number of five most common reasons for an encounter (ICPC chapter codes) per student per follow-up year is presented in online supplemental file 3.

Students’ service utilisation differed by participation in the health examination process (table 2). Of the non-respondents to the eHQ 11% belonged to the high use-group and 45% to low use group. Of those who were referred and attended the health check 34% belonged to the high use group and 31% to the group low use group.

The results of the multinomial logistic regression are shown in table 3. The reference groups were (1) the low use group in the healthcare utilisation pattern and (2) the electronic feedback group in the health examination process status. Participating in the health examination

process was associated with elevated healthcare use. The OR for belonging to the high use-group was significantly higher among students who attended the referred health check (OR 4.7, 95% CI 3.9 to 5.6) and among females (OR 4.0, 95% CI 3.5 to 4.6). There were no statistically significant differences in healthcare utilisation patterns between eHQ non-respondents and the students whose eHQ responses did not raise concerns and thus received only electronic feedback.

DISCUSSION

This study identified four different student healthcare utilisation patterns: (1) constant low use, (2) constant high use, (3) increasing use and (4) decreasing use. Attending the health check in the first year of studies was most strongly associated with the constant high use pattern in the 6-year follow-up. Of the students who did not participate in the two-staged health screening process, 71% belonged to the constant low use group or did not use services at all. Mental health issues were the most common reason for an encounter, and these were highlighted in the constant high use group.

The greatest strength of the study was the nationwide student healthcare utilisation register data with good coverage. The data enabled the assessment of the student healthcare contacts and reasons for encounters of the whole national cohort of university entrants. To our knowledge, this was the first study to report the association of two-staged health screening with student healthcare utilisation.

There are some limitations of this study. First, the data only covered student healthcare utilisation. In Finland, in addition to student healthcare services, students are entitled to use other primary healthcare services. In 2016 approximately 80% of student’s primary healthcare contacts were actualized in the FSHS (unpublished data, the Social Insurance Institution of Finland 2020). Second, the students who attended less than six terms at university during the 6-year follow-up were excluded from the clustering (n=1357, 9% of the cohort). The excluded students differed statistically significantly from the study

Table 2 The distributions of service use groups by health examination process groups

Service use group	Did not respond to the eHQ (n=5594) %	Electronic feedback (n=3157) %	Referral to a health check, did not attend (n=1801) %	Referral to a health check, attended (n=1309) %	Referral to another consultation (n=1111) %
No use	26	13	14	0	7
Low use	45	49	42	31	45
High use	11	14	19	34	21
Increasing use	10	11	15	15	12
Decreasing use	8	13	11	20	15

The number of students in each group in parenthesis. eHQ, electronic Health Questionnaire.

Table 3 The factors associated with the service utilisation patterns of university students (n=10 791) modelled with multinomial logistic regression analysis

Variables	High use OR (95% CI)	Increasing use OR (95% CI)	Decreasing use OR (95% CI)
Sex			
Male	Reference	Reference	Reference
Female	4.04 (3.54 to 4.60)	1.75 (1.55 to 1.98)	2.25 (1.97 to 2.57)
Age			
(≥30)	Reference	Reference	Reference
17–21	2.49 (1.91 to 3.24)	1.41 (1.09 to 1.81)	1.19 (0.92 to 1.52)
22–24	2.29 (1.70 to 3.07)	1.35 (1.01 to 1.79)	1.36 (1.02 to 1.81)
25–29	2.02 (1.48 to 2.75)	1.33 (0.99 to 1.80)	1.45 (1.08 to 1.94)
The health examination process status			
Electronic feedback	Reference	Reference	Reference
Did not respond to the eHQ	1.14 (0.98 to 1.32)	0.95 (0.82 to 1.10)	1.00 (0.85 to 1.17)
Referred to health check: attended	4.69 (3.91 to 5.64)	1.85 (1.50 to 2.27)	3.20 (2.60 to 3.92)
Referred to health check: did not attend	1.86 (1.56 to 2.22)	1.41 (1.18 to 1.69)	1.33 (1.09 to 1.62)
Referred to another consultation than health check	1.49 (1.22 to 1.82)	0.94 (0.75 to 1.18)	1.54 (1.24 to 1.92)

The reference group for the outcome was the low use group in the healthcare utilisation pattern while the reference groups of the other variables are marked into the table. In addition to the variables shown in the table, the model was adjusted based on the field of study and service units of FSHS. eHQ, electronic Health Questionnaire; FSHS, Finnish Student Health Service.

population (online supplemental file 1). They were older and more likely male. As their contacts represented only less than 2% of the total contacts, it made no relevant difference in the results.

The study was conducted in a real-life setting and, therefore, the compared health examination process groups could not be matched. This may affect the interpretation of the results of this study. Previous research has shown that students who participate in the health examination process of the FSHS have more health problems, especially mental health issues, than non-participants.³⁵

This study adds to the previous research about the frequency of mental health issues in the student population.^{10–12 36–38} World Mental Health Survey of the WHO was conducted in 21 countries.¹² Every fifth college student had mental disorder during the past 12 months. In Finnish university student population, 30% of the students had mental health problems measured by 12-item General Health Questionnaire.²⁹ In this study, every fourth student contacted the FSHS for psychological reason at least once during the follow-up. Psychological reasons for an encounter covered 22% of the overall contacts, being the most common reason for an encounter. In a study with 23 universities and 730 000 students in the USA, mental health was only the fifth most common ICD-9 diagnostic group, with 9% of the encounters classified as mental health related.¹⁴ There may be various explanations for the high use of student healthcare of Finnish university students for psychological reasons. First, the results of this study indicate, that the health examination process of the FSHS enhances the detection of mental health problems of university

entrants. The process may serve as a gateway to mental health services and therefore, increase the service utilisation. Second, in Finland, stigmatising attitudes related to mental health have been found to be less common as compared with the average general opinion among Europeans.³⁹ However, to our knowledge, there are no Finnish studies about how this affects health service utilisation. Among American college students' personal stigma was significantly associated with lower help-seeking; however, perceived public stigma was not.^{40 41} A third factor explaining the high mental health service utilisation may be mainly free of cost mental health services in the FSHS.

In this study, more than 70% of the contacts were made by females. The finding is supported by the previous findings about females using more healthcare services compared with males.^{14 20 42} In a previous study, Finnish female university students reported more psychological and physical symptoms and use more sexual health services compared with males, which may explain the result.²⁹ Further, it seems that male's help-seeking threshold is higher than that of females. A study by Davies *et al* revealed that college men in the USA were aware that they had important health needs; however, they took little action to address them.⁴³ A systematic review stated that there is little published evidence on how to improve men's uptake of health promotion services.⁴⁴

According to previous studies it could be expected that attending the health check would be most strongly associated with the decreasing service use pattern or like in Thomsen's primary healthcare study from Denmark, no differences between health screening participants and non-participants would be detected.^{6 7 22} The association

with the decreasing as well as increasing pattern was present here, however, the health check was even more strongly associated with constant high use pattern. This study confirmed previous findings about the health screening process enhancing the detection of students' health problems, especially mental health issues.^{19 35} In the constant high use group, the proportion of psychological contacts was the highest among all groups. However, high proportions of psychological contacts can also be seen in the increasing and decreasing groups. Mental health problems may require frequent long-term treatment and could therefore explain the association of the health check with the constant high use pattern. Young adulthood is a transitional phase in which the responsibility for the student's health is often shifted from care takers to the student himself or herself. One of the goals of student healthcare is to teach young adults to operate in a healthcare system. It is possible that in this phase, the help seeking threshold is lower than in other phases of life, and this might explain the relatively high proportion of students in the constant high use group. Another reason might be fairly good access to care, which might increase the demand.⁴⁵

Students who did not participate in the health examination process most likely belonged to the constant low service use group or else did not use services at all. One previous study indicated that non-participants were healthier than the participants.³⁵ These findings suggest that the participants had healthcare service needs and the health examination process served as a tool to reach them. In another study, it was found that students who did not participate in the FSHS health examination process were less likely to graduate than the participants.⁴⁶ It should be considered that among the non-participants, there might be students who have wide ranging problems that affect their study ability and help-seeking behaviour.

The results of this study are generalisable to Finnish higher education students. Student healthcare systems and university student population characteristics differ between countries and these factors limit the generalisability of the results to other countries.

CONCLUSIONS

The two-staged health screening process detects students with health problems. The eHQ seems to serve as a tool to reach students with mental health issues. Health check conducted at the beginning of university studies was associated with the constant high use of student health services during the six-year follow-up. Mental health issues were the most common reason for an encounter in university student population in Finnish student health care.

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Patient consent for publication Not applicable.

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