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Complete List of Authors:	Homlong, Lisbeth; Institute of Health and society, University of Oslo, Department of General Practice/Family Medicine Haavet, Ole; Institute of Health and Society, Department of General Practice Rosvold, Elin; Institute of Health and Society, Department of General Practice
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Can use of health-care services in 15-year-olds predict an increased risk of high school dropout? A longitudinal community study.

Lisbeth Homlong, Elin O. Rosvold, Ole R. Haavet

Department of General Practice, Institute of Health and Society, P.O. Box 1130, Blindern, N-0318 Oslo, University of Oslo, Norway,

Lisbeth Homlong, PhD candidate;

Elin O. Rosvold, professor;

Ole R. Haavet, associate professor.

Corresponding author:

Lisbeth Homlong

Mail: lisbeth.homlong@medisin.uio.no

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Article summary

Can use of health-care services in 15-year-olds predict an increased risk of high school dropout? A longitudinal community study.

Article focus

* To determine if health-care seeking in 15-year-olds is associated with increased risk of high-school dropout five years later.

* To investigate relationships between health-care-seeking behaviour and health in 15-year-olds and level of high-school dropout five years later.

Key messages

* Adolescents who see the child and adolescent mental health services at age 15, have a considerably higher rate of high school dropout, compared to their peers.

* Adolescents who attend youth health clinics and school health services could be at risk of high school dropout.

* Boys who attend a GP regularly are less likely to become high school dropouts.

Strengths and limitations

The results from this study are based on a large community study with a substantial number of participants with a high response rate and few missing data, which is linked to data on high school dropout from the National Education Registry later on. The prospective-longitudinal design gives a higher power compared to a cross-sectional design, since we could observe a temporal order of events on an individual level. The baseline survey was conducted in six Norwegian counties in both urban and rural areas and encompasses the entire youth population in these regions. The adolescent study sample should be representative, therefore, for a general youth population. Furthermore, the compulsory Norwegian registries provided us with complete, reliable follow-up material. The items adressed in the baseline questionnaire have some limitations. The help-seeking variables provide us with no reasons for the adolescents' encounters with the health system. The questions concerning health lack information on the severity or chronicity of conditions. Self-report can also imply an understimation of both health service use and information on health, especially when it comes to use of mental health services and mental health problems.

ABSTRACT

Objectives: To determine if health-care seeking in 15-year-olds is associated with increased risk of high-school dropout five years later.

Design: Longitudinal community study.

Setting: Data from a comprehensive youth health survey performed in 2000–2004, linked to data from national registries up to 2010.

Participants: 13 964 10th grade secondary school students in six Norwegian counties.

Main outcome measure: Logistic regression is used to compute odds ratios for high-school dropout.

Results: The total proportion of students not completing high-school five years after registering as students was 29% (girls 24%, boys 34%). Frequent attenders to school health services and the youth health clinic at age 15 had a higher percentage dropout rate (37/48% and 45/71%), compared with those with no use (22/33%) or moderate use (25/40%). Adolescents referred to mental health services were also more likely to drop out (47/62%). Boys with moderate use of a general practitioner (GP) had a lower dropout rate (30%).

In a multiple logistic regression analysis, where we adjusted for selected health indicators and sociodemographic background variables, we found that seeking help from the youth health clinic, school health services and consulting child and adolescent mental health services, were associated with an increased risk of high-school dropout five years later. Frequent attenders (≥4 contacts) had the highest probability of dropping out. Seeing a GP 1–3 times over the previous year was associated with a lower risk of high-school dropout among boys.

Conclusions: Adolescents who seek help at certain health-care services can be at risk of dropping out of high-school later. Health workers should pay particular attention to these adolescents and offer follow-up when needed. On the other hand, boys who attended a GP regularly were more likely to continue to high-school graduation, which may indicate a protective effect of having a regular and stable relationship with a GP.

INTRODUCTION

Adolescents reporting poor health tend to have an underconsumption of health-care facilities, and a considerable proportion of them seem to have health problems not met by health-care professionals. [1-3] Other studies have suggested that a minority of adolescents with mental health problems seek health-care for this reason. [4, 5] Nevertheless, help-seekers should be considered a vulnerable group. A US study has shown that disturbed adolescents more frequently seek help from professional health-care services than do their non-disturbed peers. [6] Furthermore, adolescent frequent attenders to primary health-care report more physical health complaints, more emotional problems and more days off school than do regular primary health-care attenders. [7]

Poor mental and physical health are among several factors which can influence on health seeking behaviour and an adolescent's ability to graduate from high-school. [8, 9] Although chronic disease in childhood has an impact on educational level and work participation in adult life, [10, 11] less is known about the effects of ill health during adolescent years. [9] An increasing load of mental health problems in young people can play a role, [12, 13] including depressive symptomatology, which several studies have shown to be associated with high-school dropout. [14, 15] In a recent Norwegian study, one out of five high school dropouts reported that they quit because of mental health problems. [16] Previous research indicates that teenage pregnancy and substance abuse are also associated with dropping out. [17 18]

A substantial number of adolescents drop out of high-school, placing themselves at higher risk of marginalisation later in life [8, 19] and generating considerable public attention in recent years. Education is a key to participation in adult work life, and high-school graduation has a strong influence on future health and well-being. [8, 20] A recent Norwegian study has shown that high-school-dropouts are at higher risk than their peers of receiving social security

benefits five years later. [21] Previous studies have found a strong association between low educational level and early receipt of a disability pension. [11, 22]

Dropping out of high-school and marginalisation among young adults are fields that must be approached from different angles. The aim of our study was to determine if use of health-care services in adolescents could predict an increased risk of high-school dropout in a longitudinal perspective, by exploring relationships between health-care-seeking behaviour and health in 15-year-olds and level of high-school dropout five years later.

METHODS

Population

A large comprehensive health survey of all 10th grade secondary school students (aged 15–16, later referred to as 15-year-olds) in six Norwegian counties, including its capital, Oslo, was conducted between 2000 and 2004. The overall response rate in the studies was 87% (n=15 966). The survey comprised questions about relationships with family, friends and school; physical and mental health; health behaviour; and life events. More detailed information about the health survey is available on the website of the Norwegian Institute of Public Health. [23]

Questionnaire data from the study were linked with data from the National Education Registry and the National Insurance Services (NIS/FD-trygd), compulsory national databases which supply detailed information on the entire cohort up to the year 2010. A precise linkage of records was possible because of the national identification number given to every resident of Norway. After linkage by Statistics Norway, the national identification numbers were removed from the data sets and kept within a safe computer system to secure anonymity for each individual. At baseline, the adolescent contributors to the questionnaires were asked for their consent to link the data from the questionnaires to national registers at a later date; 90% out 15 966 in our baseline population agreed (n=14 062).

From the National Insurance Services we obtained information on participants who were granted an early permanent disability benefit (n=55) during the follow-up period. We excluded those individuals from the study, as a majority were diagnosed with mild to moderate mental retardation, diagnoses within the autistic spectrum; or severe psychiatric disorders like schizophrenia – conditions which were not compatible with high-school graduation.

Participants who died (n=43) during follow-up time were also excluded from the analyses, leaving us with a total study group of n=13 964.

Table 1 about here

Variables

High-school dropout

From the National Education registry, we gained information on high-school dropout, which is the main outcome variable in this paper. In Norway, adolescents normally begin high-school at age 15–16, immediately after finishing 10th grade, which is the last year of obligatory schooling in Norway. Students are supposed to complete high-school within three years. Those who did not graduate within five years after registering as high-school students were defined for the purposes of this study as high-school-dropouts. [24]

Use of health-care services

In the baseline questionnaires, participants answered questions about help seeking from the health-care system over the 12 months prior to the survey, whether through school health services, youth health clinic, general practitioner (GP), child and adolescent mental health services. The GP, the school health services and the youth health clinic in Norway are considered low-threshold parts of the primary health-care system, and are all free of charge for children and adolescents up to the age of 16. The services of child and adolescent mental health are paid for by the government, but a referral is required from a GP or another physician. To measure the use of health-care services, the contributors were given three options – “none”, “1–3” or “4 or more” – for number of contacts during the past year. In our analyses, we aggregated contacts with the child and adolescent mental health services into

two categories: “none” or “1 or more” contacts. The *reason* for visiting any of the service providers was not registered in the questionnaires.

Health indicators

At baseline, adolescents were asked questions concerning their health, including direct questions on specific conditions. As adjustment variables we used the baseline questions addressing the adolescents self-perceptions of the status of their general health, if they had or have had asthma or allergy, and conditions experienced in the 12 months prior to the survey: serious illness or injury; headache, abdominal pain, neck pain or shoulder pain, back pain or pain in extremities. The contributors could answer ‘yes’ or ‘no’ to these health and pain questions. Self-rated health is a health measure which can predict later morbidity, mortality, health service use and early disability. [25] During adolescence, self-rated health status appears to be relatively stable, and it seems not to be changed by medical diagnoses or by mental or somatic health symptoms. [25] Self-rated health is considered to have good reliability for adults. [26] In the baseline questionnaire, self-rated health was categorised into four options: ‘bad’, ‘not good’, ‘good’ or ‘very good’. In our analyses, we dichotomised this variable into two categories: ‘very good or good’ and ‘not good or bad’. We also aggregated the pain variables into a dichotomous variable, in which three or more pain sites indicated a positive pain score and two or fewer indicated a negative pain score. We consider widespread pain to be an independent indicator of ill health. We also know from previous research that there is a certain comorbidity in adults between depressive disorders and chronic pain. [27] Level of mental health problems were scored using the HSCL-10, a short-form of the SCL-25, and an instrument designed to diagnose depression in primary health care. [28] The HSCL-10 includes ten questions about psychological symptoms experienced over the previous week and is validated for use both in general practice and in epidemiological studies. [29] A sum score above 1.6 indicates mild, moderate or severe depression among 14–16-year-olds.

Statistical analyses

Analyses of the data set were performed using multiple logistic regression analysis in SPSS version 19.0, with high-school dropout as the outcome variable. In the crude model, we tested the variables concerning health service use separately and odds ratios were computed for high-school dropout. In the adjusted model, use of health care services were adjusted for each other, for the selected health indicators and for sociodemographic background variables. All analyses were stratified by gender.

RESULTS

Girls comprised 50.3% of our study group. Descriptive data of the population is presented in Table 1. Missing data caused by skipped questions concerning health status and health-care seeking varied from 1.0% to 5.6%. Follow-up data indicated that 28.9% of the students did not complete high-school within five years (girls 23.8%, boys 34.2%). The descriptive baseline material revealed that 70% of the adolescents attended one or more health-care services over the previous year: school health services (girls 32.4%, boys 16.4%), youth health clinic (girls 21.1, boys 7.8%), GP (girls 59.5, boys 46.5%), child and adolescent mental health services (girls 6.9, boys 3.7%). Girls had substantially more contacts than did boys. A smaller number of the adolescents reported four or more contacts with school health services (girls 4.7, boys 0.9%) and the youth health clinic (girls 3.7, boys 0.6%), whereas 12.1% of the girls and 6.6% of the boys reported multiple contacts with a GP.

With few exceptions, adolescents who reported use of different health care services the past 12 months, generally reported more health problems, compared to those who reported no use of such health services (Table 2). Among frequent attenders (≥4 visits), a substantial higher percentage reported health problems compared to those with moderate use of services. This was the case for both girls and boys.

Table 2 about here

As shown in Table 3, a higher rate of high school dropouts were observed among frequent attenders to the school health services (girls 36.5%, boys 48.3%) and the youth health clinic (girls 44.5, boys 71.0%), compared to those with no or moderate use (1–3 visits). Also adolescents referred to the mental health service had a higher dropout rate (girls 47.0, boys 62.0%). Boys with moderate use of a GP, had a lower dropout rate (29.8%).

Table 3 about here

Table 4 shows that visiting the child and adolescent mental health services at age 15 was strongly associated with high-school dropout five years later, in both genders (girls' odds ratio 3.18, 95% confidence interval 2.63 to 3.84; boys 3.37, 2.60 to 4.37). Likewise, seeking help at the youth health clinic (1–3 contacts: girls 1.83, 1.60 to 2.10; boys 1.64, 1.36 to 1.97. ≥4 contacts: girls 2.37, 1.94 to 3.95; boys 5.02, 2.48 to 10.14). The associations remained significant after adjustment for use of other health-care services, health indicators and sociodemographic variables – except for boys with moderate use of the youth health clinic. In the unadjusted analyses, attending the school health services was associated with dropout (1–3: girls 1.15, 1.01 to 1.30; boys 1.36, 1.19 to 1.56. ≥4: girls 2.02, 1.59 to 2.56; boys 1.93, 1.16 to 3.21).

1–3 contacts with the GP the previous year was associated with a lower level of high-school dropout in boys (0.73, 0.65 to 0.81). Boys who were regular users of a GP also had a significant lower dropout rate in the adjusted model.

Table 4 about here

DISCUSSION

Main findings

15-year-olds who attended the youth health clinic and those who saw the child and adolescent mental health services had a considerably higher rate of high-school dropout five years later than did those who did not seek help at these services. We also found that use of the school health services was related to dropout, in both genders, but not after adjustments though. On the other hand, boys who attended a GP regularly were more likely to continue to high-school graduation, which may indicate a protective effect of having a regular and stable relationship with a GP.

Strengths and weaknesses

The substantial number of participants in geographical diverse areas, along with a high response rate and few missing data constitute strengths of this prospective community study. The adolescent study sample should be representative, therefore, for a general youth population. Furthermore, the compulsory Norwegian registries provided us with complete, reliable follow-up material. The prospective-longitudinal design provided the opportunity to observe a temporal order of events on an individual level, and it can be argued that the power is stronger compared to that of a cross-sectional design. One should, however, be careful to draw conclusions about causal relationships, given the observational nature of the study.

The baseline survey was conducted in six Norwegian counties in both urban and rural areas and encompasses the entire youth population in these regions. Yet, because local variations in the health-care service accessibility can influence help-seeking behaviour, our results may not be applicable in all settings.

One limitation to the questions concerning health, variables which are adjusted for in the analyses, is the lack of information they provide on the severity or chronicity of conditions.Furthermore, the help-seeking variables in the baseline survey provide us no reasons for the adolescents' encounters with the health system. Self-report can also imply an understimation of health service use, especially when it comes to the mental health services. Other health problems than those adjusted for in our analyses could also have influenced help-seeking behaviour and dropout. Yet disability benefits acquired at a young age were considered to have been the result of the most serious health disabilities, and were therefore excluded from our sample.

A recent validation study confirms that the HSCL-10 instrument, which we have used to measure mental health problems, is a suitable diagnostic tool in adolescents in this age group, and is also found to be appropriate for use in epidemiological studies. [29] Although our cutoff point of 1.6 has been validated as optimal for detecting mild, moderate and severe depression in 14–16-year-olds of both genders, [29] it can be argued that this cutoff may be low, and thereby define an unreasonably large proportion of adolescents as depressed. Previous studies have shown, though, that adolescents with a depressive symptom load, without meeting the diagnostic threshold for a depressive disorder, a so-called 'subsyndromal depression', can have a persistent functional impairment. [30, 31] Another constraint is no measure of other types of mental health problems.

High-school dropout has been chosen as the outcome variable because it is an early marker for later work marginalisation and social exclusion. [11, 21, 22] Previous studies indicate that those who drop out of high-school have a higher risk of becoming dependent on welfare benefits in adult life, including receipt of an early disability pension. [11, 32, 33] It can be argued that the five-year limit is strict, but it is consistent with other studies on school

dropout, and few of those who fail to complete high-school within five years succeed in finishing later. [24] Approximately 15% of those who drop out of high-school in Norway are unemployed or have not registered in any other activity three years later. [19]

Comparison with previous research

Health service use in adolescence seems to be a proxy for problems which can be independent risk factors for dropout. Even though several studies confirms an under-use of health-care among adolescents who struggle with somatic and mental health issues, [1, 34] both previous research [7] and the descriptive material in our study shown in Table 2 confirms that help-seekers constitute a group which generally have a greater load of health problems compared to non-seekers, and should receive special attention.

Both structural and individual factors influence help seeking. [34, 35] From previous research we know that such sociodemographic characteristics as economic status and parents' educational level influence both help seeking [2, 7] and high school graduation. [8, 19] Health complaints which commonly lead adolescents to seek help can also influence dropout. After correcting for such factors in our analyses, we still found a negative outcome in adolescents seeking help at the youth health clinic and the mental health services, indicating that they have other challenges that can explain the higher probability for dropout. On the other hand, help-seekers may have resources and certain personal qualities that enable them to recognise and cope with their problems – a characteristic for which we cannot correct in the analyses. [3]

Youth health clinics in Norway provide free advice and prescriptions for birth control and treatment of sexually transmitted diseases. In addition, it is a low-threshold service where adolescents can consult a nurse or a phycisian about mental health issues. Visiting the youth

health clinic multiple times at 15 years of age can indicate sexual debut at an early age. We know that adolescent pregnancy is a risk factor for lower educational achievement, [18] but less is known about early sexual activity in general and high-school dropout. A previous study has shown associations between low academic achievement and high level of externalising behaviour and early sexual debut in both genders. [36] A US study on adolescents receiving mental health treatment shows associations between both externalising and internalising psychiatric disorders and sexual risk-taking behaviour. [37] To the best of our knowledge, there is limited research on boys who attend the youth health clinic or similar services, and there are few boys in our sample with multiple encounters. Those who do, however, have a dropout rate above 70%. Our results indicate that health workers in youth health clinics should be aware of and offer follow-up to adolescents with multiple encounters.

The Norwegian school health services are located at each local school and are normally run by a school nurse. Commonly, a consultant GP is also present at a regular basis. The service can include individual health consultations, as well as group-based health and lifestyle advice. There are, however, substantial variations among schools and among regions. A recent US study has found an association between low to moderate use of school-based health centres and reduction of dropout for high school students. [38] The American school-based health centres, however, offer a wider range of health services than do school health services in Norway, and are therefore not directly comparable. Most of previous research on school-based health services has been conducted outside Scandinavia and is not relevant for the organisation of the Norwegian system. [39] Our result may indicate, however, that adolescent frequent attenders to the school health services in Norway represent a vulnerable group, with lower socioeconomic privilege and with more health problems than non-users, and suggests that school nurses should be attentive to them.

We found that the consulting the child and adolescent mental health services was associated with a considerably higher rate of school dropout. Because a referral is needed to see the mental health services, we argue that individuals who qualify for specialised therapy usually have relatively severe mental health problems. A previous study has shown that there is a dose-response association between help-seeking for mental health problems and symptom load of anxiety and depression. [40] Furthermore, early-onset mental disorders have been shown to be associated with lower educational attainment. [12, 13] It is not surprising, then, that the outcome in the group consulting mental health services at age 15 is less fortunate.

Boys who saw a GP regularly had a lower rate of high-school dropout, although there was no such statistically significant relationship for girls. This finding suggests that, for boys, having a stable relationship with a GP in their adolescent years can have a positive impact. Yet whereas we assume that the boys who use GP services are consulting for health problems and that they are helped in some way, they may also have individual resources which explain their better outcomes. Teenage boys have a substantially lower use of health care services than girls do, including seeing a GP. [41] They are also more reluctant to seek help for emotional problems [35] unless severely distressed. [42] This situation may have affected our results.

Implications for policy and practice

Previous research confirms that adolescents have frequent encounters with the primary health-care services every year, [4, 43, 44] which is consistent with our findings. These contacts provide golden opportunities to uncover somatic health problems and mental distress. Health workers in the primary health-care services should be aware of teenagers with multiple health service encounters and offer follow-up when needed. It is also important to refer to the specialist services when the severity of the condition calls for it. Our results clearly show that

when adolescents are referred to second-line mental health services, the condition is well entrenched and the prognosis is consequently more negative.

Youth health clinics are low-threshold services which are visited by a substantial number of adolescents every year, especially young girls. Considering the high probability of dropout among attenders of this service, as shown in our study, health workers should be recommended to focus particularly on these adolescents and the content of their treatment.

A paradox is that while girls report a higher level of health service use and more health problems, they have a considerably lower level of dropout, compared to boys. This calls for a broader approach concerning the relationship between health and high school dropout. More research is needed to entangle the role of health services in dealing with adolescent health and possible preventive potential for adolescents' symptom load and functional impairment in the following years.

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Contributors: All three authors contributed to the study design, discussions of the results andwriting of the final paper. LH prepared the data, undertook the primary analyses and the first interpretations and wrote the first draft of the paper. ORH and EOR supervised the analyses and critically reviewed the paper. ORH and EOR also took part in planning and conducting the original baseline survey. All authors approved the submitted version.

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Competing interests: All authors have completed the Unified Competing Interest form at www.icmje.org/coi_disclosure.pdf (available on request from the corresponding author) and declare no competing interests.

Ethical approval: The study was approved by the Norwegian Institute of Public Health, Statistics Norway, the Ministry of Education and Research and the Medical Ethics Committee. These institutions gave permission for the use and linkage of the data. The adolescent participants gave a written consent to link their questionnaire data to national registers at a later date.

Data sharing: no additional data available.

WHAT IS ALREADY KNOWN IN THIS TOPIC

High school dropouts are at risk of later marginalisation.

Poor physical and mental health can influence high school dropout.

Adolescents who use health care services constitute a vulnerable group.

WHAT THIS STUDY ADDS

Adolescents who see the child and adolescent mental health services at age 15, have a considerably higher rate of high school dropout, compared to their peers.

Adolescents who attend youth health clinics and school health services could be at risk of high school dropout.

Boys who attend a GP regularly are less likely to become high school dropouts.

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Table1 Descriptive characteristics of the population at baseline (2000–2004) and follow-up (2010)

At baseline (N=13 964): **Gender**		N	%
	Girls	7019	50.3
	Boys	5945	49.7
Sociodemographic characteristics			
Parents' educational level			
	Primary school	1864	13.5
	High school	5681	41.3
	College or university degree	6214	45.2
Parents' marital status			
	Married or living together	9255	66.8
	Other	4600	33.2
Household income			
	Very good, good or mediocre	13278	96.7
	Poor	457	3.3
Status at follow-up			
High school drop-out			
	Total	4040	28.9
	Girls	1668	23.8
	Boys	2372	34.2

Table 2: Percentage of 15-year-olds reporting different health problems within type and level of reported health care use, all numbers stratified by gender (N=13964)

	Asthma		Allergy		Poor self-perceived health		Experienced serious illness/injury past 12 months		Pain sites ≥3 past 12 months		HSCL10≥1.6	
	Girls	Boys	Girls	Boys	Girls	Boys	Girls	Boys	Girls	Boys	Girls	Boys
Overall numbers	910 (13.7)	897 (13.5)	2756 (41.0)	2448 (36.5)	960 (13.9)	645 (9.4)	606 (9.2)	651 (9.9)	2683 (40.4)	1473 (22.3)	2390 (35.2)	906 (13.4)
Self-reported level of health care use												
School health services												
No	565 (12.7)	726 (13.2)	1758(39.1)	2008 (36.1)	556 (12.1)	492 (8.7)	351 (8.0)	498 (9.1)	1555 (35.0)	1135 (20.7)	1415 (31.1)	688 (12.2)
1-3	270 (15.0)	150 (14.8)	821 (44.8)	398 (38.8)	296 (15.7)	132(12.5)	189 (10.6)	133 (13.3)	894 (48.8)	298 (29.7)	750 (40.3)	194 (18.9)
≥4	63 (20.7)	8 (13.3)	150 (48.1)	20 (35.1)	86 (26.8)	10 (16.7)	54 (17.9)	11 (19.3)	201 (65.3)	24 (41.4)	200 (63.3)	22 (36.7)
Youth health clinic												
No	671 (12.8)	796 (13.1)	2093 (39.6)	2214 (36.2)	679 (12.6)	553 (8.8)	433 (8.3)	567 (9.4)	1922 (36.8)	1289 (21.3)	1709 (32.1)	786 (12.7)
1-3	183 (16.3)	79 (16.9)	533 (46.5)	191 (40.6)	201 (16.9)	70 (14.4)	138 (12.5)	68 (14.8)	591 (51.8)	150 (32.3)	524 (44.7)	103 (21.5)
≥4	49 (20.3)	5 (13.5)	114 (46.5)	11 (30.6)	67 (26.4)	7 (18.4)	34 (14.3)	7 (19.4)	150 (61.7)	13 (36.1)	146 (57.9)	12 (33.3)
General practitioner												
No	237 (8.8)	365 (10.4)	870 (32.2)	1128 (31.9)	258 (9.3)	301 (8.3)	108 (4.1)	192 (5.5)	805 (30.2)	605 (17.3)	796 (29.2)	437 (12.2)
1-3	485 (15.6)	410 (15.6)	1413 (44.8)	1074 (40.7)	466 (14.4)	255 (9.4)	284 (9.2)	314 (12.0)	1377 (44.0)	680 (26.1)	1155 (36.3)	373 (13.9)
≥4	178 (22.8)	105 (24.4)	450 (56.2)	208 (47.5)	223 (27.1)	73 (16.2)	211 (27.4)	137 (32.2)	480 (60.2)	163 (38.6)	422 (51.7)	90 (20.4)
Child and adolescent mental health services												
No	810 (13.2)	834 (13.2)	2499 (40.3)	2323 (36.3)	793 (12.5)	584 (8.9)	525 (8.6)	601 (9.6)	2383(38.8)	2655 (21.6)	2046 (32.6)	803 (12.4)
≥1	87 (19.5)	47 (19.5)	238 (51.7)	96 (39.8)	147 (31.5)	46 (18.5)	76 (17.7)	43 (18.5)	272 (60.0)	90 (37.5)	323 (69.5)	96 (40.5)

Table 3: Health and health care seeking behaviour in 15-year-olds and percentage of high school dropout 5 years later (N=13 964)

		Girls		Boys	
		N(%)	Dropout %	N(%)	Dropout %
Self-reported level of health care use					
School health services	*No*	4690 (67.7)	22.2	5728 (83.6)	32.7
	1-3	1917 (27.7)	24.6	1064 (15.5)	39.8
	≥4	323 (4.7)	36.5	60 (0.9)	48.3
Youth health clinic	*No*	5496 (79.0)	20.8	6314 (92.3)	32.8
	1-3	1209 (17.4)	32.4	490 (7.2)	44.5
	≥4	256 (3.7)	44.5	38 (0.6)	71.1
General practitioner	*No*	2808 (40.5)	23.4	3653 (53.4)	36.8
	1-3	3289 (47.4)	22.5	2729 (39.9)	29.8
	≥4	841 (12.1)	27.8	453 (6.6)	36.0
Child and adolescent mental health services	*No*	6463 (93.1)	21.8	6590 (96.3)	32.8
	≥1	477 (6.9)	47.0	251 (3.7)	62.2
Health indicators					
Asthma	*No*	5730 (86.3)	23.1	5753 (86.5)	33.3
	Yes	910 (13.7)	27.1	897 (13.5)	37.9
Allergy	*No*	3958 (59.0)	21.9	4261 (63.5)	33.5
	Yes	2756 (41.0)	25.9	2448 (36.5)	34.4
Self-perceived health	*Very good/good*	5932 (86.1)	21.8	6227 (90.6)	32.8
	Not good/poor	960 (13.9)	36.8	645 (9.4)	46.8
Serious illness/injury past 12 months	*No*	5956 (90.8)	23.1	5929 (90.1)	33.4
	Yes	606 (9.2)	24.2	651 (9.9)	37.2
Pain sites reported past 12 months	*<3*	3917 (59.6)	19.6	5107 (77.7)	31.6
	≥3	2463 (40.4)	28.7	1385 (22.3)	40.9
HSCL10	*<1.6*	4391 (64.8)	19.3	5848 (86.6)	31.8
	≥1.6	2390 (35.2)	30.5	906 (13.4)	45.7
Sociodemo-graphic variables					
Parents' marital status	*Married/living together*	4655 (66.6)	18.4	4600 (67.0)	28.8
	Other	2335 (33.4)	34.2	2265(33.0)	44.1
Household income	*Very good/good/ mediocre*	6662 (96.4)	22.8	6616 (97.0)	33.3
	Poor	250 (3.6)	45.6	207 (3.0)	48.3
Parents' educational level	*College/university degree*	3136 (45.3)	12.2	3078 (45.0)	20.7
	High school	2867 (41.4)	29.1	2814 (41.1)	39.5
	Primary school	915 (13.2)	44.3	949 (13.9)	59.1

Table 4: Associations between health care seeking behaviour evaluated in 10th grade adolescents and high school drop-out five years later. Investigated using multiple logistic regression analysis. Associations expressed in odds ratios (OR) with 95% confidence intervalls (CI).

		Crude		Adjusted†	
		Girls	Boys	Girls	Boys
Self-reported level of health care use		OR (95% CI)	OR (95% CI)	OR (95% CI)	OR (95% CI)
School health services	*None (ref)*				
	1-3	**1.15 (1.01 to 1.30)***	**1.36 (1.19 to 1.56)*****	0.84 (0.72 to 0.99)	1.16 (0.98 to 1.37)
	≥4	**2.02 (1.59 to 2.56)*****	**1.93 (1.16 to 3.21)***	0.88 (0.65 to 1.19)	0.77 (0.40 to 1.47)
Youth health clinic	*None (ref)*				
	1-3	**1.83 (1.60 to 2.10)*****	**1.64 (1.36 to 1.97)*****	**1.72 (1.45 to 2.05)*****	1.19 (0.94 to 1.49)
	≥4	**2.37 (1.94 to 3.95)*****	**5.02 (2.48 to 10.14)*****	**1.97 (1.44 to 2.71)*****	**2.80 (1.26 to 6.21)***
General practitioner	*None (ref)*				
	1-3	0.95 (0.84 to 1.07)	**0.73 (0.65 to 0.81)*****	0.85 (0.73 to 0.99)	**0.69 (0.61 to 0.78)*****
	≥4	**1.26 (1.06 to 1.50)****	0.96 (0.79 to 1.18)	0.83 (0.66 to 1.05)	0.85 (0.66 to 1.09)
Child and adolescent mental health services	*No (ref)*				
	≥1	**3.18 (2.63 to 3.84)*****	**3.37 (2.60 to 4.37)*****	**2.05 (1.61 to 2.62)*****	**2.76 (2.01 to 3.79)****

† In the adjusted model use of each health service is adjusted for use of the other health care services, relevant health indicators and sociodemographic variables

*** *significant relationship, p≤0.001*

** *significant relationship, p≤0.01*

* *significant relationship, p≤0.05*

STROBE Statement—Checklist of items that should be included in reports of ***cohort studies***

	Item No	Recommendation
Title and abstract	1	(*a*) Indicate the study's design with a commonly used term in the title or the abstract
		(*b*) Provide in the abstract an informative and balanced summary of what was done and what was found
Introduction		
Background/rationale	2	Explain the scientific background and rationale for the investigation being reported
Objectives	3	State specific objectives, including any prespecified hypotheses
Methods		
Study design	4	Present key elements of study design early in the paper
Setting	5	Describe the setting, locations, and relevant dates, including periods of recruitment, exposure, follow-up, and data collection
Participants	6	(*a*) Give the eligibility criteria, and the sources and methods of selection of participants. Describe methods of follow-up
		(*b*) For matched studies, give matching criteria and number of exposed and unexposed
Variables	7	Clearly define all outcomes, exposures, predictors, potential confounders, and effect modifiers. Give diagnostic criteria, if applicable
Data sources/ measurement	8*	For each variable of interest, give sources of data and details of methods of assessment (measurement). Describe comparability of assessment methods if there is more than one group
Bias	9	Describe any efforts to address potential sources of bias
Study size	10	Explain how the study size was arrived at
Quantitative variables	11	Explain how quantitative variables were handled in the analyses. If applicable, describe which groupings were chosen and why
Statistical methods	12	(*a*) Describe all statistical methods, including those used to control for confounding
		(*b*) Describe any methods used to examine subgroups and interactions
		(*c*) Explain how missing data were addressed
		(*d*) If applicable, explain how loss to follow-up was addressed
		(*e*) Describe any sensitivity analyses
Results		
Participants	13*	(a) Report numbers of individuals at each stage of study—eg numbers potentially eligible, examined for eligibility, confirmed eligible, included in the study, completing follow-up, and analysed
		(b) Give reasons for non-participation at each stage
		(c) Consider use of a flow diagram
Descriptive data	14*	(a) Give characteristics of study participants (eg demographic, clinical, social) and information on exposures and potential confounders
		(b) Indicate number of participants with missing data for each variable of interest
		(c) Summarise follow-up time (eg, average and total amount)
Outcome data	15*	Report numbers of outcome events or summary measures over time
Main results	16	(*a*) Give unadjusted estimates and, if applicable, confounder-adjusted estimates and their precision (eg, 95% confidence interval). Make clear which confounders were adjusted for and why they were included
		(*b*) Report category boundaries when continuous variables were categorized
		(*c*) If relevant, consider translating estimates of relative risk into absolute risk for a meaningful time period

Other analyses	17	Report other analyses done—eg analyses of subgroups and interactions, and sensitivity analyses
Discussion		
Key results	18	Summarise key results with reference to study objectives
Limitations	19	Discuss limitations of the study, taking into account sources of potential bias or imprecision. Discuss both direction and magnitude of any potential bias
Interpretation	20	Give a cautious overall interpretation of results considering objectives, limitations, multiplicity of analyses, results from similar studies, and other relevant evidence
Generalisability	21	Discuss the generalisability (external validity) of the study results
Other information		
Funding	22	Give the source of funding and the role of the funders for the present study and, if applicable, for the original study on which the present article is based

*Give information separately for exposed and unexposed groups.

Note: An Explanation and Elaboration article discusses each checklist item and gives methodological background and published examples of transparent reporting. The STROBE checklist is best used in conjunction with this article (freely available on the Web sites of PLoS Medicine at http://www.plosmedicine.org/, Annals of Internal Medicine at http://www.annals.org/, and Epidemiology at http://www.epidem.com/). Information on the STROBE Initiative is available at http://www.strobe-statement.org.

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Can use of health care services in 15–16-year-olds predict an increased level of high school dropout? A longitudinal community study.

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Can use of health care services among 15–16-year-olds predict an increased level of high school dropout? A longitudinal community study.

Lisbeth Homlong, Elin O. Rosvold, Ole R. Haavet

Department of General Practice, Institute of Health and Society, P.O. Box 1130, Blindern, N-0318 Oslo, University of Oslo, Norway,

Lisbeth Homlong, PhD candidate;

Elin O. Rosvold, professor;

Ole R. Haavet, associate professor.

Corresponding author:

Lisbeth Homlong

Mail: lisbeth.homlong@medisin.uio.no

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Article summary

Can use of health care services among 15–16-year-olds predict an increased level of high school dropout? A longitudinal community study.

Article focus

* To determine if health care seeking among 15–16-year-olds is associated with high school dropout five years later.

* To investigate the relationship between health care seeking behaviour and health among 15–16-year-olds and level of high school dropout five years later.

Key messages

* Adolescents who make contacts with the child and adolescent mental health services at age 15–16, are more likely than their peers to drop out of high school.

* Adolescents who attend youth health clinics and school health services could be at risk of becoming high school dropouts.

* Boys who visit a GP regularly are less likely to become high school dropouts.

Strengths and limitations

The results of this study are based on a large community study with a substantial number of participants, yielding a high response rate and few missing data. The prospective–longitudinal design provides a higher power than does a cross-sectional design, because we were able to observe a temporal order of events on an individual level. The baseline survey was conducted in six Norwegian counties in both urban and rural areas and encompasses the entire youth population in these regions. Thus, the adolescent study sample should be representative for a general youth population. Furthermore, the compulsory Norwegian registries linked to the baseline data provided us with complete, reliable follow-up material. The items addressed in the baseline questionnaire have some limitations, however. The help-seeking variables did not provide us with reasons for the adolescents' encounters with the health system. The questions concerning health lack information on the severity or chronicity of conditions. Self-reports can also engender an underestimation of health service use and incomplete information on health – especially mental health problems and the use of mental health services.

ABSTRACT

Objectives: To study associations between health care seeking in 15–16-year-olds and high school dropout five years later.

Design: Longitudinal community study.

Setting: Data from a comprehensive youth health survey conducted

in 2000–2004, linked to data from national registries up to 2010.

Participants: 13 964 10th grade secondary school students in six Norwegian counties.

Main outcome measure: Logistic regression is used to compute odds ratios for high school dropout.

Results: The total proportion of students not completing high school five years after registering was 29% (girls 24%, boys 34%). Frequent attenders to school health services and youth health clinics at age 15–16 had a higher dropout rate (37/48% and 45/71%), compared with those with no (22/33%) or moderate use (25/40%). Adolescents referred to mental health services were also more likely to drop out (47/62%). Boys with moderate use of a general practitioner (GP) had a lower dropout rate (30%).

A multiple logistic regression analysis, in which we adjusted for selected health indicators and sociodemographic background variables, revealed that seeking help from the youth health clinic and consulting child and adolescent mental health services, were associated with increased odds of high school dropout five years later. Frequent attenders (≥4 contacts) had the highest odds of dropping out. Yet boys who saw a GP 1–3 times over the previous year were less likely than their peers to drop out from high school.

Conclusions: Adolescents who seek help at certain health care services can be at risk of dropping out of high school later. Health workers should pay particular attention to frequent attenders and offer follow-up when needed. On the other hand, boys who attended a GP regularly were more likely to continue to high school graduation, which may indicate a protective effect of having a regular and stable relationship with a GP.

INTRODUCTION

Adolescents reporting poor health tend to have an underconsumption of health care facilities according to their expected needs, and due to this a considerable proportion of them seem to have health problems not met by health care professionals. [1-3] Other studies have suggested that only a minority of adolescents with mental health problems seek health care for these reasons. [4, 5] Nevertheless, help seekers should be considered a vulnerable group. A US study has shown that disturbed adolescents more frequently seek help from professional health care services than do their non-disturbed peers. [6] Furthermore, adolescent frequent attenders to primary health care report more physical health complaints, more emotional problems and more days off school than do regular primary health care attenders. [7]

Poor mental and physical health are among several factors which can have an influence on help seeking behaviour and at adolescents' ability to graduate from high school. [8, 9] Although chronic disease in childhood has an impact on educational level and work participation in adult life, [10, 11] less is known about the effects of ill health during adolescent years. [9] An increasing load of mental health problems in young people, including depressive symptomatology, can play a role [12, 13] and several studies have shown an association with failure to complete high school. [14, 15] In a recent Norwegian study, one out of five high school dropouts reported that they quit because of mental health problems. [16] Previous research indicates that teenage pregnancy and substance abuse are also associated with dropping out. [17, 18]

A substantial number of adolescents drop out of high school, placing themselves at higher risk of marginalisation later in life [8, 19] and generating considerable public attention in recent years. Norway and several other western countries experience the same challenges. In Norway, adolescents normally enrol in high school at age 15–16, immediately after finishing

10th grade, which is the last year of compulsory school. Students are supposed to complete high school within three years. Those who fail to graduate within five years after registering as students are defined as high school dropouts. A recent Norwegian study has shown that high school dropouts are at higher risk than their peers of receiving social security benefits five years later. [20] Previous studies have found a strong association between low educational level and early receipt of a disability pension. [11, 21] Education is a key to participation in adult work life, and high school graduation has a strong influence on future health and well-being. [8, 22]

The concept of marginalisation is often used to describe a process that in a worst case scenario can end up in permanent exclusion.[23] Dropping out of high school can be a first step in the process of marginalisation. High school dropout and marginalisation among young adults are fields that must be approached from different angles. Both individual characteristics and contextual factors related to family, friends, the community, the schools and the school system have an influence on dropout.

In our study we address the problem from a health-related perspective, by exploring if adolescents at risk have made contacts with the health services already at age 15–16. Help seeking behaviour cannot be explored without including health and sociodemographic background factors. As we consider help seekers a vulnerable group, the aim of our study was to determine if adolescent help seekers also have increased odds of high school dropout in a longitudinal perspective. We wanted to investigate this by exploring relationships between health-care-seeking behaviour and health in 15–16-year-olds and level of high school dropout five years later.

METHODS

Population

A large comprehensive health survey of all 10th grade secondary school students (aged 15–16) in six Norwegian counties, was conducted between 2000 and 2004. The youth survey was initiated in Oslo in 2000 and was extended to include five more counties in the following years 2001–2004. Originally 18 425 10th graders were invited to the baseline studies, while the overall response rate was 87% (n=15 966). The study was organised as a classroom survey, where the pupils filled out a written questionnaire during 2 school hours. An assistant was present to provide information to the participants and administer the questionnaires. Pupils not present at school at the day of the survey were left questionnaires at the schools to be filled out later. Those not responding received a copy by mail to their home address along with a stamped return envelope.

Participation in the survey was voluntary and the pupils signed an informed consent in advance. The survey comprised questions about relationships with family, friends and school; physical and mental health; health behaviour; and life events. [24] More detailed information about the health survey is available on the website of the Norwegian Institute of Public Health. [25]

Questionnaire data from the study were linked to data from the National Education Registry and the National Insurance Services (NIS/FD-trygd), compulsory national databases which supply detailed information on the entire cohort up to the year 2010. A precise linkage of records was possible because of the national identification number given to every resident of Norway. After linkage by Statistics Norway, the national identification numbers were removed from the data sets and kept within a safe computer system to secure anonymity for each individual. At baseline, the adolescent contributors to the questionnaires were asked for

their consent to link the data from the questionnaires to national registers at a later date; 90% of the 15 966 in our baseline population agreed (n=14 062).

From the National Insurance Services we obtained information on participants who were granted an early permanent disability benefit (n=55) during the follow-up period. We excluded those individuals from the study, as a majority were diagnosed with mild to moderate mental retardation, diagnoses within the autistic spectrum; or severe psychiatric disorders like schizophrenia – conditions which were not compatible with high-school graduation.

Participants who died (n=43) during follow-up time were also excluded from the analyses, leaving us with a total study group of n=13 964.

Ethics

The study was approved by the Regional Committee for Medical and Health Research Ethics and by the Norwegian Data Inspectorate. These institutions gave permission for the use and linkage of the data. The adolescent participants gave a written consent to link their questionnaire data to national registers at a later date.

Table 1 about here

Variables

High-school dropouts

From the National Education registry, we gained information on adolescents who had failed to complete high school, which is the main outcome variable in this paper. In Norway, adolescents normally enrol in high-school at age 15–16, immediately after finishing 10th grade, which is the last year of obligatory schooling in Norway. Students are supposed to

complete high school within three years. Those who did not graduate within five years after registering as high-school students were defined for the purposes of this study as high-school-dropouts. [26]

Use of health-care services

In the baseline questionnaires, participants answered questions about help seeking from the health-care system over the 12 months prior to the survey, whether through school health services, youth health clinic, general practitioner (GP), or child and adolescent mental health services. The GP, the school health services and the youth health clinic in Norway are considered low-threshold parts of the primary health-care system, and are all free of charge for children and adolescents up to the age of 16. The services of child and adolescent mental health are paid for by the government, but a referral is required from a GP or another physician. To measure the use of health-care services, the contributors were given three response options – "none", "1–3" or "4 or more" – for number of contacts during the past year. In our analyses, we aggregated contacts with the child and adolescent mental health services into two categories: "none" or "1 or more" contacts. The *reason* for visiting any of the service providers was not measured in the questionnaires.

Health indicators

At baseline, adolescents were asked questions concerning their health, including direct questions on specific conditions. As adjustment variables we used the baseline questions addressing the adolescents' self-perceptions of the status of their general health, if they had or have had asthma or allergies, and conditions experienced in the 12 months prior to the survey: serious illness or injury; headache, abdominal pain, neck pain or shoulder pain, back pain or pain in extremities. The contributors could answer 'yes' or 'no' to these health and pain

questions. Self-rated health is a health measure which can predict later morbidity, mortality, health service use and early disability. [27] During adolescence, self-rated health status appears to be relatively stable, and it seems not to be changed by medical diagnoses or by mental or somatic health symptoms. [27] Self-rated health is considered to have good reliability for adults. [28] In the baseline questionnaire, self-rated health was categorised into four options: 'bad', 'not good', 'good' or 'very good'. In our analyses, we dichotomised this variable into two categories: 'very good or good' and 'not good or bad'. We also aggregated the pain variables into a dichotomous variable, in which three or more pain sites indicated a positive pain score and two or fewer indicated a negative pain score. We consider widespread pain to be an independent indicator of ill health. We also know from previous research that there is a certain comorbidity in adults between depressive disorders and chronic pain. [29] Level of mental health problems were scored using the Hopkin's Symptom Checklist-10 (HSCL-10), a short-form of the Hopkin's Symptom Checklist-25 (SCL-25), and an instrument designed to diagnose depression in primary health care. [30] The HSCL-10 includes ten questions about psychological symptoms experienced over the previous week and is validated for use both in general practice and in epidemiological studies. [31] A sum score above 1.6 indicates mild, moderate or severe depression among 14–16-year-olds.

Sociodemographics

The sociodemographic background variables concerning parents' marital situation and household income were based on self-reports from the baseline questionnaires. The pupils were asked whether their parents' were 'married/living together'; 'divorced/separated'; 'one or both dead'; or 'other'. We chose to dichotomise these options into 'married/living together' or 'other'. The question concerning household income were categorised into 'very good'; 'good'; 'mediocre'; or 'poor'. Here we chose to collapse 'very good' and 'good' into one

category, which we used as the reference category. Information on parents' educational level was provided by Statistics Norway. The highest accomplished educational level of one of the parents was used, leaving us with four categories: 'higher college or university degree' (>4 years); 'lower college or university degree'; 'high school'; or 'primary school'.

Statistical analyses

Analyses of the data set were performed using multiple logistic regression analysis in SPSS version 19.0, with high-school dropout as the outcome variable. In the crude model, we tested the variables concerning health service usage separately and odds ratios were computed for high-school dropout. In the adjusted model, use of health care services were adjusted for each other, for the selected health indicators and for sociodemographic background variables. All analyses were stratified by gender.

RESULTS

Girls comprised 50.3% of our study group. Descriptive data of the population is presented in Table 1. Missing data caused by skipped questions concerning health-care seeking varied from 0.8% to 1.6%, while the questions on health had missing values from 1.1% to 6.5%. Follow-up data indicated that 28.9% of the students did not complete high school within five years (girls 23.8%, boys 34.2%). The descriptive baseline material revealed that 70% of the adolescents attended one or more health-care services over the previous year: school health services (girls 32.4%, boys 16.4%), youth health clinic (girls 21.1, boys 7.8%), GP (girls 59.5, boys 46.5%), child and adolescent mental health services (girls 6.9, boys 3.7%). Girls had substantially more contacts than did boys. A smaller number of the adolescents reported four or more contacts with school health services (girls 4.7, boys 0.9%) and the youth health clinic (girls 3.7, boys 0.6%), whereas 12.1% of the girls and 6.6% of the boys reported multiple contacts with a GP.

With few exceptions, adolescents who reported use of different health care services during the past 12 months, generally reported more health problems, compared to those who reported no use of such health services (Table 2). Among frequent attenders (≥4 visits), a substantially higher percentage reported health problems compared to those with moderate use of services. This was the case for both girls and boys.

Table 2 about here

As shown in Table 3, a higher rate of high school dropouts were observed among frequent attenders to the school health services (girls 36.5%, boys 48.3%) and the youth health clinic (girls 44.5, boys 71.1%), compared to those with no or moderate use (1–3 visits). Also adolescents referred to the mental health service had a higher dropout rate (girls 47.0, boys 62.2%). Boys with moderate use of a GP, had a lower dropout rate (29.8%).

Table 3 about here

Table 4 shows that visiting the child and adolescent mental health services at age 15–16 was strongly associated with dropping out of high school five years later, in both genders (girls' odds ratio 3.18, 95% confidence interval 2.63 to 3.84; boys 3.37, 2.60 to 4.37). Likewise, seeking help at the youth health clinic (1–3 contacts: girls 1.83, 1.60 to 2.10; boys 1.64, 1.36 to 1.97. ≥4 contacts: girls 3.06, 2.37 to 3.95; boys 5.02, 2.48 to 10.14). The associations remained significant after adjustment for use of other health care services, health indicators and sociodemographic variables – except for boys with moderate use of the youth health clinic. In the unadjusted analyses, attending the school health services was associated with dropping out of high school (1–3: girls 1.15, 1.01 to 1.30; boys 1.36, 1.19 to 1.56. ≥4: girls 2.02, 1.59 to 2.56; boys 1.93, 1.16 to 3.21).

Between 1and 3 contacts with the GP the previous year was associated with a lower level of high-school dropout in boys (0.73, 0.65 to 0.81). Boys who were regular users of a GP also had a significant lower dropout rate in the adjusted model.

Table 4 about here

DISCUSSION

Main findings

Results revealed that 15–16-year-olds who attended the youth health clinic and those who saw the child and adolescent mental health services were significantly more likely to drop out of high school five years later than were those who did not seek help at these services. We also found that use of school health services was related to high school dropout, in both genders, but not after adjustments had been made. On the other hand, boys who attended a GP regularly were more likely to continue to high-school graduation, which may indicate a protective effect of having a regular and stable relationship with a GP.

Strengths and weaknesses

The substantial number of participants in geographical diverse areas, along with a high response rate and few missing data constitute strengths of this prospective community study. The adolescent study sample should be representative, therefore, for a general youth population. Furthermore, the compulsory Norwegian registries provided us with complete, reliable follow-up material. The prospective-longitudinal design provided the opportunity to observe a temporal order of events on an individual level, and it can be argued that the power is stronger compared to that of a cross-sectional design. One should be careful, however, not to draw conclusions about causal relationships, given the observational nature of the study.

The baseline survey was conducted in six Norwegian counties in both urban and rural areas and encompasses the entire youth population in these regions. Yet, because local variations in the accessibility of health-care services can influence help-seeking behaviour, our results may not be applicable in all settings.

One limitation of the questions concerning health – variables which were adjusted for in the analyses – is the lack of information they provide on the severity or chronicity of conditions. Furthermore, the help-seeking variables in the baseline survey provide no reasons for the adolescents' encounters with the health system. Self-reports can imply an underestimation of health service usage, especially use of mental health services. Other health problems than those adjusted for in our analyses could have influenced help-seeking behaviour and failure to complete high school. Yet disability benefits acquired at a young age were considered to have been the result of the most serious health disabilities, and were therefore excluded from our sample.

A recent validation study confirms that the HSCL-10 instrument, which we have used to measure mental health problems, is a suitable diagnostic tool for adolescents in this age group, and is also found to be appropriate for use in epidemiological studies. [31] Although our cutoff point of 1.6 has been validated as optimal for detecting mild, moderate and severe depression in 14–16-year-olds of both genders, [31] it can be argued that this cutoff may be low, and could thereby define an unreasonably large proportion of adolescents as depressed. Another constraint is lack of a measure of other types of mental health problems.

High-school dropout has been chosen as the outcome variable because it is an early marker for later work marginalisation and social exclusion. [11, 20, 21] Previous studies indicate that those who drop out of high school have a higher risk of becoming dependent on welfare benefits in adult life, including receipt of an early disability pension. [11, 34, 35] It can be argued that the five-year limit is strict, but it is consistent with other studies on school dropout, and few of those who fail to complete high school within five years succeed in finishing later. [26]

Comparison with previous research

We do not imply that health service use in adolescence causes high-school dropout, rather that it is a proxy for problems which can be independent risk factors for dropout. Even though several studies confirm an under-use of health care among adolescents who struggle with somatic and mental health issues, [1, 36] both previous research [7] and the descriptive material in our study, as shown in Table 2, confirm that help seekers constitute a group which generally have a greater load of health problems compared to non-seekers, and should receive special attention. Both structural and individual factors influence help seeking. [36, 37] From previous research we know that such sociodemographic characteristics as economic status and parents' educational level influence both help seeking [2, 7] and high school graduation. [8, 19] Health complaints which commonly lead adolescents to seek help can also influence them to drop out. After correcting for such factors in our analyses, we found a negative outcome in adolescents seeking help at the youth health clinic and the mental health services, indicating that they have other challenges that can explain their higher probability of dropping out. On the other hand, help seekers may have resources and certain personal qualities that enable them to recognise and cope with their problems – a characteristic for which we cannot correct in the analyses. [3]

Youth health clinics in Norway provide free advice and prescriptions for birth control and treatment of sexually transmitted diseases. In addition, it is a low-threshold service centre where adolescents can consult a nurse or a physician about mental health issues. Visiting the youth health clinic multiple times at 15–16 years of age can indicate sexual debut at an early age. We know that adolescent pregnancy is a risk factor for lower educational achievement, [18] but less is known about early sexual activity in general and failure to complete high school. A previous study has shown associations between low academic achievement and

high level of externalising behaviour and early sexual debut in both genders. [38] A US study on adolescents receiving mental health treatment shows associations between both externalising and internalising psychiatric disorders and sexual risk-taking behaviour. [39] To the best of our knowledge, there is limited research on boys who attend the youth health clinic or similar services, and there are few boys in our sample with multiple encounters. Those who have multiple encounters, however, have a dropout rate above 70%. Our results indicate that health workers in youth health clinics should be aware of and offer follow-up to adolescents with multiple visits.

We found that consulting the child and adolescent mental health services was associated with lower odds for graduating from high school. Because a referral is needed in order to see the mental health services, we argue that individuals who qualify for specialised therapy usually have relatively severe mental health problems. A previous study has shown that there is a dose-response association between help-seeking for mental health problems and symptom load of anxiety and depression. [42] Furthermore, early-onset mental disorders have been shown to be associated with lower educational attainment. [12, 13] It is not surprising, then, that the outcome in the group consulting mental health services at age 15–16 is less fortunate.

Boys who saw a GP regularly were more likely to graduate from high school than their peers, although there was no such statistically significant relationship for girls. This finding suggests that, for boys, having a stable relationship with a GP in their adolescent years can have a positive impact. Yet whereas we assume that the boys who use GP services are consulting for health problems and that they are helped in some way, they may also have individual resources which explain their better outcomes. Teenage boys have a substantially lower use of health care services than girls do, including seeing a GP. [43] They are also more reluctant to seek help for emotional problems [37] unless severely distressed. [44]

Implications for policy and practice

Previous research confirms that adolescents have frequent encounters with the primary health-care services every year, [4, 45, 46] which is consistent with our findings. These contacts provide golden opportunities to uncover somatic health problems and mental distress. Health workers in the primary health-care services should pay particular attention to adolescents with multiple health service encounters and offer follow-up when needed. It is also important to refer to the specialist services when the severity of the condition calls for it. Our results clearly show that by the time adolescents are referred to second-line mental health services, their conditions are well entrenched and the prognosis is consequently more negative.

Youth health clinics are low-threshold services which are visited by a substantial number of adolescents every year – especially young girls. Considering the high probability of dropping out among attenders of this service, as shown in our study, health workers should be advised to focus particularly on these adolescents and the content of their treatment.

Whereas girls report more health problems and a higher level of health service usage than boys do, they are more likely to graduate from high school – a dilatation that calls for a broader approach to the relationship between health and failure to complete high school. More research is needed to disentangle the role of health services in dealing with adolescent health and possible preventive potential for adolescents' symptom load and functional impairment in the following years.

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Contributors: All three authors contributed to the study design, discussions of the results andwriting of the final paper. LH prepared the data, undertook the primary analyses and the first interpretations and wrote the first draft of the paper. ORH and EOR supervised the analyses and critically reviewed the paper. ORH and EOR also took part in planning and conducting the original baseline survey. All authors approved the submitted version.

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Ethical approval: The study was approved by the Norwegian Institute of Public Health, Statistics Norway, the Ministry of Education and Research and the Medical Ethics Committee. These institutions gave permission for the use and linkage of the data. The adolescent participants gave written consent to link their questionnaire data to national registers at a later date.

Data sharing: no additional data available.

WHAT IS ALREADY KNOWN ON THIS TOPIC

High school dropouts are at risk of later marginalisation.

Poor physical and mental health is related to dropping out from high school.

Adolescents who use health care services constitute a vulnerable group.

WHAT THIS STUDY ADDS

Adolescents who see the child and adolescent mental health services at age 15, are more likely to drop out from high school, compared to their peers.

Adolescents who attend youth health clinics could be at risk of high school dropout.

Boys who attend a GP regularly are less likely to become highschool dropouts.

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Can use of health care services among 15–16-year-olds predict an increased level of high school dropout? A longitudinal community study.

Lisbeth Homlong, Elin O. Rosvold, Ole R. Haavet

Department of General Practice, Institute of Health and Society, P.O. Box 1130, Blindern, N-0318 Oslo, University of Oslo, Norway,

Lisbeth Homlong, PhD candidate;

Elin O. Rosvold, professor;

Ole R. Haavet, associate professor.

Corresponding author:

Lisbeth Homlong

Mail: lisbeth.homlong@medisin.uio.no

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Article summary

Can use of health care services among 15–16-year-olds predict an increased level of high school dropout? A longitudinal community study.

Article focus

* To determine if health care seeking among 15–16-year-olds is associated with high school dropout five years later.

* To investigate the relationship between health care seeking behaviour and health among 15–16-year-olds and level of high school dropout five years later.

Key messages

* Adolescents who make contacts with the child and adolescent mental health services at age 15–16, are more likely than their peers to drop out of high school.

* Adolescents who attend youth health clinics and school health services could be at risk of becoming high school dropouts.

* Boys who visit a GP regularly are less likely to become high school dropouts.

Strengths and limitations

The results of this study are based on a large community study with a substantial number of participants, yielding a high response rate and few missing data. The prospective–longitudinal design provides a higher power than does a cross-sectional design, because we were able to observe a temporal order of events on an individual level. The baseline survey was conducted in six Norwegian counties in both urban and rural areas and encompasses the entire youth population in these regions. Thus, the adolescent study sample should be representative for a general youth population. Furthermore, the compulsory Norwegian registries linked to the baseline data provided us with complete, reliable follow-up material. The items addressed in the baseline questionnaire have some limitations, however. The help-seeking variables did not provide us with reasons for the adolescents' encounters with the health system. The questions concerning health lack information on the severity or chronicity of conditions. Self-reports can also engender an underestimation of health service use and incomplete information on health – especially mental health problems and the use of mental health services.

ABSTRACT

Objectives: To study associations between health care seeking in 15–16-year-olds and high school dropout five years later.

Design: Longitudinal community study.

Setting: Data from a comprehensive youth health survey conducted

in 2000–2004, linked to data from national registries up to 2010.

Participants: 13 964 10th grade secondary school students in six Norwegian counties.

Main outcome measure: Logistic regression is used to compute odds ratios for high school dropout.

Results: The total proportion of students not completing high school five years after registering was 29% (girls 24%, boys 34%). Frequent attenders to school health services and youth health clinics at age 15–16 had a higher dropout rate (37/48% and 45/71%), compared with those with no (22/33%) or moderate use (25/40%). Adolescents referred to mental health services were also more likely to drop out (47/62%). Boys with moderate use of a general practitioner (GP) had a lower dropout rate (30%).

A multiple logistic regression analysis, in which we adjusted for selected health indicators and sociodemographic background variables, revealed that seeking help from the youth health clinic and consulting child and adolescent mental health services, were associated with increased odds of high school dropout five years later. Frequent attenders (≥4 contacts) had the highest odds of dropping out. Yet boys who saw a GP 1–3 times over the previous year were less likely than their peers to drop out from high school.

Conclusions: Adolescents who seek help at certain health care services can be at risk of dropping out of high school later. Health workers should pay particular attention to frequent attenders and offer follow-up when needed. On the other hand, boys who attended a GP regularly were more likely to continue to high school graduation, which may indicate a protective effect of having a regular and stable relationship with a GP.

INTRODUCTION

Adolescents reporting poor health tend to have an underconsumption of health care facilities according to their expected needs, and due to this a considerable proportion of them seem to have health problems not met by health care professionals. [1-3] Other studies have suggested that only a minority of adolescents with mental health problems seek health care for these reasons. [4, 5] Nevertheless, help seekers should be considered a vulnerable group. A US study has shown that disturbed adolescents more frequently seek help from professional health care services than do their non-disturbed peers. [6] Furthermore, adolescent frequent attenders to primary health care report more physical health complaints, more emotional problems and more days off school than do regular primary health care attenders. [7]

Poor mental and physical health are among several factors which can have an influence on help seeking behaviour and at adolescents' ability to graduate from high school. [8, 9] Although chronic disease in childhood has an impact on educational level and work participation in adult life, [10, 11] less is known about the effects of ill health during adolescent years. [9] An increasing load of mental health problems in young people, including depressive symptomatology, can play a role [12, 13] and several studies have shown an association with failure to complete high school. [14, 15] In a recent Norwegian study, one out of five high school dropouts reported that they quit because of mental health problems. [16] Previous research indicates that teenage pregnancy and substance abuse are also associated with dropping out. [17, 18]

A substantial number of adolescents drop out of high school, placing themselves at higher risk of marginalisation later in life [8, 19] and generating considerable public attention in recent years. Norway and several other western countries experience the same challenges. In Norway, adolescents normally enrol in high school at age 15–16, immediately after finishing

10th grade, which is the last year of compulsory school. Students are supposed to complete high school within three years. Those who fail to graduate within five years after registering as students are defined as high school dropouts. A recent Norwegian study has shown that high school dropouts are at higher risk than their peers of receiving social security benefits five years later. [20] Previous studies have found a strong association between low educational level and early receipt of a disability pension. [11, 21] Education is a key to participation in adult work life, and high school graduation has a strong influence on future health and well-being. [8, 22]

The concept of marginalisation is often used to describe a process that in a worst case scenario can end up in permanent exclusion.[23] Dropping out of high school can be a first step in the process of marginalisation. High school dropout and marginalisation among young adults are fields that must be approached from different angles. Both individual characteristics and contextual factors related to family, friends, the community, the schools and the school system have an influence on dropout.

In our study we address the problem from a health-related perspective, by exploring if adolescents at risk have made contacts with the health services already at age 15–16. Help seeking behaviour cannot be explored without including health and sociodemographic background factors. As we consider help seekers a vulnerable group, the aim of our study was to determine if adolescent help seekers also have increased odds of high school dropout in a longitudinal perspective. We wanted to investigate this by exploring relationships between health-care-seeking behaviour and health in 15–16-year-olds and level of high school dropout five years later.

METHODS

Population

A large comprehensive health survey of all 10th grade secondary school students (aged 15–16) in six Norwegian counties, was conducted between 2000 and 2004. The youth survey was initiated in Oslo in 2000 and was extended to include five more counties in the following years 2001–2004. Originally 18 425 10th graders were invited to the baseline studies, while the overall response rate was 87% (n=15 966). The study was organised as a classroom survey, where the pupils filled out a written questionnaire during 2 school hours. An assistant was present to provide information to the participants and administer the questionnaires. Pupils not present at school at the day of the survey were left questionnaires at the schools to be filled out later. Those not responding received a copy by mail to their home address along with a stamped return envelope.

Participation in the survey was voluntary and the pupils signed an informed consent in advance. The survey comprised questions about relationships with family, friends and school; physical and mental health; health behaviour; and life events. [24] More detailed information about the health survey is available on the website of the Norwegian Institute of Public Health. [25]

Questionnaire data from the study were linked to data from the National Education Registry and the National Insurance Services (NIS/FD-trygd), compulsory national databases which supply detailed information on the entire cohort up to the year 2010. A precise linkage of records was possible because of the national identification number given to every resident of Norway. After linkage by Statistics Norway, the national identification numbers were removed from the data sets and kept within a safe computer system to secure anonymity for each individual. At baseline, the adolescent contributors to the questionnaires were asked for

their consent to link the data from the questionnaires to national registers at a later date; 90% of the 15 966 in our baseline population agreed (n=14 062).

From the National Insurance Services we obtained information on participants who were granted an early permanent disability benefit (n=55) during the follow-up period. We excluded those individuals from the study, as a majority were diagnosed with mild to moderate mental retardation, diagnoses within the autistic spectrum; or severe psychiatric disorders like schizophrenia – conditions which were not compatible with high-school graduation.

Participants who died (n=43) during follow-up time were also excluded from the analyses, leaving us with a total study group of n=13 964.

Ethics

The study was approved by the Regional Committee for Medical and Health Research Ethics and by the Norwegian Data Inspectorate. These institutions gave permission for the use and linkage of the data. The adolescent participants gave a written consent to link their questionnaire data to national registers at a later date.

Table 1 about here

Variables

High-school dropouts

From the National Education registry, we gained information on adolescents who had failed to complete high school, which is the main outcome variable in this paper. In Norway, adolescents normally enrol in high-school at age 15–16, immediately after finishing 10th grade, which is the last year of obligatory schooling in Norway. Students are supposed to

complete high school within three years. Those who did not graduate within five years after registering as high-school students were defined for the purposes of this study as high-school-dropouts. [26]

Use of health-care services

In the baseline questionnaires, participants answered questions about help seeking from the health-care system over the 12 months prior to the survey, whether through school health services, youth health clinic, general practitioner (GP), or child and adolescent mental health services. The GP, the school health services and the youth health clinic in Norway are considered low-threshold parts of the primary health-care system, and are all free of charge for children and adolescents up to the age of 16. The services of child and adolescent mental health are paid for by the government, but a referral is required from a GP or another physician. To measure the use of health-care services, the contributors were given three response options – "none", "1–3" or "4 or more" – for number of contacts during the past year. In our analyses, we aggregated contacts with the child and adolescent mental health services into two categories: "none" or "1 or more" contacts. The *reason* for visiting any of the service providers was not measured in the questionnaires.

Health indicators

At baseline, adolescents were asked questions concerning their health, including direct questions on specific conditions. As adjustment variables we used the baseline questions addressing the adolescents' self-perceptions of the status of their general health, if they had or have had asthma or allergies, and conditions experienced in the 12 months prior to the survey: serious illness or injury; headache, abdominal pain, neck pain or shoulder pain, back pain or pain in extremities. The contributors could answer 'yes' or 'no' to these health and pain

questions. Self-rated health is a health measure which can predict later morbidity, mortality, health service use and early disability. [27] During adolescence, self-rated health status appears to be relatively stable, and it seems not to be changed by medical diagnoses or by mental or somatic health symptoms. [27] Self-rated health is considered to have good reliability for adults. [28] In the baseline questionnaire, self-rated health was categorised into four options: 'bad', 'not good', 'good' or 'very good'. In our analyses, we dichotomised this variable into two categories: 'very good or good' and 'not good or bad'. We also aggregated the pain variables into a dichotomous variable, in which three or more pain sites indicated a positive pain score and two or fewer indicated a negative pain score. We consider widespread pain to be an independent indicator of ill health. We also know from previous research that there is a certain comorbidity in adults between depressive disorders and chronic pain. [29] Level of mental health problems were scored using the Hopkin's Symptom Checklist-10 (HSCL-10), a short-form of the Hopkin's Symptom Checklist-25 (SCL-25), and an instrument designed to diagnose depression in primary health care. [30] The HSCL-10 includes ten questions about psychological symptoms experienced over the previous week and is validated for use both in general practice and in epidemiological studies. [31] A sum score above 1.6 indicates mild, moderate or severe depression among 14–16-year-olds.

Sociodemographics

The sociodemographic background variables concerning parents' marital situation and household income were based on self-reports from the baseline questionnaires. The pupils were asked whether their parents' were 'married/living together'; 'divorced/separated'; 'one or both dead'; or 'other'. We chose to dichotomise these options into 'married/living together' or 'other'. The question concerning household income were categorised into 'very good'; 'good'; 'mediocre'; or 'poor'. Here we chose to collapse 'very good' and 'good' into one

category, which we used as the reference category. Information on parents' educational level was provided by Statistics Norway. The highest accomplished educational level of one of the parents was used, leaving us with four categories: 'higher college or university degree' (>4 years); 'lower college or university degree'; 'high school'; or 'primary school'.

Statistical analyses

Analyses of the data set were performed using multiple logistic regression analysis in SPSS version 19.0, with high-school dropout as the outcome variable. In the crude model, we tested the variables concerning health service usage separately and odds ratios were computed for high-school dropout. In the adjusted model, use of health care services were adjusted for each other, for the selected health indicators and for sociodemographic background variables. All analyses were stratified by gender.

RESULTS

Girls comprised 50.3% of our study group. Descriptive data of the population is presented in Table 1. Missing data caused by skipped questions concerning health-care seeking varied from 0.8% to 1.6%, while the questions on health had missing values from 1.1% to 6.5%. Follow-up data indicated that 28.9% of the students did not complete high school within five years (girls 23.8%, boys 34.2%). The descriptive baseline material revealed that 70% of the adolescents attended one or more health-care services over the previous year: school health services (girls 32.4%, boys 16.4%), youth health clinic (girls 21.1, boys 7.8%), GP (girls 59.5, boys 46.5%), child and adolescent mental health services (girls 6.9, boys 3.7%). Girls had substantially more contacts than did boys. A smaller number of the adolescents reported four or more contacts with school health services (girls 4.7, boys 0.9%) and the youth health clinic (girls 3.7, boys 0.6%), whereas 12.1% of the girls and 6.6% of the boys reported multiple contacts with a GP.

With few exceptions, adolescents who reported use of different health care services during the past 12 months, generally reported more health problems, compared to those who reported no use of such health services (Table 2). Among frequent attenders (≥4 visits), a substantially higher percentage reported health problems compared to those with moderate use of services. This was the case for both girls and boys.

Table 2 about here

As shown in Table 3, a higher rate of high school dropouts were observed among frequent attenders to the school health services (girls 36.5%, boys 48.3%) and the youth health clinic (girls 44.5, boys 71.1%), compared to those with no or moderate use (1–3 visits). Also adolescents referred to the mental health service had a higher dropout rate (girls 47.0, boys 62.2%). Boys with moderate use of a GP, had a lower dropout rate (29.8%).

Table 3 about here

Table 4 shows that visiting the child and adolescent mental health services at age 15–16 was strongly associated with dropping out of high school five years later, in both genders (girls' odds ratio 3.18, 95% confidence interval 2.63 to 3.84; boys 3.37, 2.60 to 4.37). Likewise, seeking help at the youth health clinic (1–3 contacts: girls 1.83, 1.60 to 2.10; boys 1.64, 1.36 to 1.97. ≥4 contacts: girls 3.06, 2.37 to 3.95; boys 5.02, 2.48 to 10.14). The associations remained significant after adjustment for use of other health care services, health indicators and sociodemographic variables – except for boys with moderate use of the youth health clinic. In the unadjusted analyses, attending the school health services was associated with dropping out of high school (1–3: girls 1.15, 1.01 to 1.30; boys 1.36, 1.19 to 1.56. ≥4: girls 2.02, 1.59 to 2.56; boys 1.93, 1.16 to 3.21).

Between 1and 3 contacts with the GP the previous year was associated with a lower level of high-school dropout in boys (0.73, 0.65 to 0.81). Boys who were regular users of a GP also had a significant lower dropout rate in the adjusted model.

Table 4 about here

DISCUSSION

Main findings

Results revealed that 15–16-year-olds who attended the youth health clinic and those who saw the child and adolescent mental health services were significantly more likely to drop out of high school five years later than were those who did not seek help at these services. We also found that use of school health services was related to high school dropout, in both genders, but not after adjustments had been made. On the other hand, boys who attended a GP regularly were more likely to continue to high-school graduation, which may indicate a protective effect of having a regular and stable relationship with a GP.

Strengths and weaknesses

The substantial number of participants in geographical diverse areas, along with a high response rate and few missing data constitute strengths of this prospective community study. The adolescent study sample should be representative, therefore, for a general youth population. Furthermore, the compulsory Norwegian registries provided us with complete, reliable follow-up material. The prospective-longitudinal design provided the opportunity to observe a temporal order of events on an individual level, and it can be argued that the power is stronger compared to that of a cross-sectional design. One should be careful, however, not to draw conclusions about causal relationships, given the observational nature of the study.

The baseline survey was conducted in six Norwegian counties in both urban and rural areas and encompasses the entire youth population in these regions. Yet, because local variations in the accessibility of health-care services can influence help-seeking behaviour, our results may not be applicable in all settings.

One limitation of the questions concerning health – variables which were adjusted for in the analyses – is the lack of information they provide on the severity or chronicity of conditions. Furthermore, the help-seeking variables in the baseline survey provide no reasons for the adolescents' encounters with the health system. Self-reports can imply an underestimation of health service usage, especially use of mental health services. Other health problems than those adjusted for in our analyses could have influenced help-seeking behaviour and failure to complete high school. Yet disability benefits acquired at a young age were considered to have been the result of the most serious health disabilities, and were therefore excluded from our sample.

A recent validation study confirms that the HSCL-10 instrument, which we have used to measure mental health problems, is a suitable diagnostic tool for adolescents in this age group, and is also found to be appropriate for use in epidemiological studies. [31] Although our cutoff point of 1.6 has been validated as optimal for detecting mild, moderate and severe depression in 14–16-year-olds of both genders, [31] it can be argued that this cutoff may be low, and could thereby define an unreasonably large proportion of adolescents as depressed. ~~Previous studies have shown, though, that adolescents with a depressive symptom load, without meeting the diagnostic threshold for a depressive disorder, a so-called 'subsyndromal depression', can have a persistent functional impairment. [32, 33]~~ Another constraint is lack of a measure of other types of mental health problems.

High-school dropout has been chosen as the outcome variable because it is an early marker for later work marginalisation and social exclusion. [11, 20, 21] Previous studies indicate that those who drop out of high school have a higher risk of becoming dependent on welfare benefits in adult life, including receipt of an early disability pension. [11, 34, 35] It can be argued that the five-year limit is strict, but it is consistent with other studies on school

dropout, and few of those who fail to complete high school within five years succeed in finishing later. [26] ~~Approximately 15% of those who drop out of high school in Norway are unemployed or have not registered in any other activity three years later. [19]~~

Comparison with previous research

We do not imply that health service use in adolescence causes high-school dropout, rather that it is a proxy for problems which can be independent risk factors for dropout. Even though several studies confirm an under-use of health care among adolescents who struggle with somatic and mental health issues, [1, 36] both previous research [7] and the descriptive material in our study, as shown in Table 2, confirm that help seekers constitute a group which generally have a greater load of health problems compared to non-seekers, and should receive special attention. Both structural and individual factors influence help seeking. [36, 37] From previous research we know that such sociodemographic characteristics as economic status and parents' educational level influence both help seeking [2, 7] and high school graduation. [8, 19] Health complaints which commonly lead adolescents to seek help can also influence them to drop out. After correcting for such factors in our analyses, we found a negative outcome in adolescents seeking help at the youth health clinic and the mental health services, indicating that they have other challenges that can explain their higher probability of dropping out. On the other hand, help seekers may have resources and certain personal qualities that enable them to recognise and cope with their problems – a characteristic for which we cannot correct in the analyses. [3]

Youth health clinics in Norway provide free advice and prescriptions for birth control and treatment of sexually transmitted diseases. In addition, it is a low-threshold service centre where adolescents can consult a nurse or a physician about mental health issues. Visiting the

youth health clinic multiple times at 15–16 years of age can indicate sexual debut at an early age. We know that adolescent pregnancy is a risk factor for lower educational achievement, [18] but less is known about early sexual activity in general and failure to complete high school. A previous study has shown associations between low academic achievement and high level of externalising behaviour and early sexual debut in both genders. [38] A US study on adolescents receiving mental health treatment shows associations between both externalising and internalising psychiatric disorders and sexual risk-taking behaviour. [39] To the best of our knowledge, there is limited research on boys who attend the youth health clinic or similar services, and there are few boys in our sample with multiple encounters. Those who have multiple encounters, however, have a dropout rate above 70%. Our results indicate that health workers in youth health clinics should be aware of and offer follow-up to adolescents with multiple visits.

~~The Norwegian school health services are located at each local school and are normally run by a school nurse. Commonly, a consultant GP is also present at a regular basis. The service can include individual health consultations, as well as group-based health and lifestyle advice. There are, however, substantial variations among schools and among regions. A recent US study has found an association between low to moderate use of school-based health centres and reduction of dropout for high school students. [40] The American school-based health centres, however, offer a wider range of health services than do school health services in Norway, and are therefore not directly comparable. Most of previous research on school-based health services has been conducted outside Scandinavia and is not relevant for the organisation of the Norwegian system. [41] Our result may indicate, however, that adolescent frequent attenders to the school health services in Norway represent a vulnerable group, with lower socioeconomic privilege and with more health problems than non-users, and suggests that school nurses should be attentive to them.~~

We found that consulting the child and adolescent mental health services was associated with lower odds for graduating from high school. Because a referral is needed in order to see the mental health services, we argue that individuals who qualify for specialised therapy usually have relatively severe mental health problems. A previous study has shown that there is a dose-response association between help-seeking for mental health problems and symptom load of anxiety and depression. [42] Furthermore, early-onset mental disorders have been shown to be associated with lower educational attainment. [12, 13] It is not surprising, then, that the outcome in the group consulting mental health services at age 15–16 is less fortunate.

Boys who saw a GP regularly were more likely to graduate from high school than their peers, although there was no such statistically significant relationship for girls. This finding suggests that, for boys, having a stable relationship with a GP in their adolescent years can have a positive impact. Yet whereas we assume that the boys who use GP services are consulting for health problems and that they are helped in some way, they may also have individual resources which explain their better outcomes. Teenage boys have a substantially lower use of health care services than girls do, including seeing a GP. [43] They are also more reluctant to seek help for emotional problems [37] unless severely distressed. [44]

Implications for policy and practice

Previous research confirms that adolescents have frequent encounters with the primary health-care services every year, [4, 45, 46] which is consistent with our findings. These contacts provide golden opportunities to uncover somatic health problems and mental distress. Health workers in the primary health-care services should pay particular attention to adolescents with multiple health service encounters and offer follow-up when needed. It is also important to refer to the specialist services when the severity of the condition calls for it. Our results

clearly show that by the time adolescents are referred to second-line mental health services, their conditions are well entrenched and the prognosis is consequently more negative.

Youth health clinics are low-threshold services which are visited by a substantial number of adolescents every year – especially young girls. Considering the high probability of dropping out among attenders of this service, as shown in our study, health workers should be advised to focus particularly on these adolescents and the content of their treatment.

Whereas girls report more health problems and a higher level of health service usage than boys do, they are more likely to graduate from high school – a dilatation that calls for a broader approach to the relationship between health and failure to complete high school. More research is needed to disentangle the role of health services in dealing with adolescent health and possible preventive potential for adolescents' symptom load and functional impairment in the following years.

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Contributors: All three authors contributed to the study design, discussions of the results andwriting of the final paper. LH prepared the data, undertook the primary analyses and the first interpretations and wrote the first draft of the paper. ORH and EOR supervised the analyses and critically reviewed the paper. ORH and EOR also took part in planning and conducting the original baseline survey. All authors approved the submitted version.

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Competing interests: All authors have completed the Unified Competing Interest form at www.icmje.org/coi_disclosure.pdf (available on request from the corresponding author) and declare no competing interests.

Ethical approval: The study was approved by the Norwegian Institute of Public Health, Statistics Norway, the Ministry of Education and Research and the Medical Ethics Committee. These institutions gave permission for the use and linkage of the data. The adolescent participants gave written consent to link their questionnaire data to national registers at a later date.

Data sharing: no additional data available.

WHAT IS ALREADY KNOWN ON THIS TOPIC

High school dropouts are at risk of later marginalisation.

Poor physical and mental health is related to dropping out from high school.

Adolescents who use health care services constitute a vulnerable group.

WHAT THIS STUDY ADDS

Adolescents who see the child and adolescent mental health services at age 15, are more likely to drop out from high school, compared to their peers.

Adolescents who attend youth health clinics could be at risk of high school dropout.

Boys who attend a GP regularly are less likely to become highschool dropouts.

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Table1 Descriptive characteristics of the study population (N=13964) at baseline, 2000–2004, and at follow-up, 2010.

At baseline:	N	%
Gender		
Girls	7019	50.3
Boys	6945	49.7
Sociodemographic characteristics		
Etnicity		
Ethnic Norwegian	12155	87.0
1st generation immigrant	1126	8.1
2nd generation immigrant	683	4.9
Parents' educational level		
College or university degree >4 years	1937	13.9
College or university degree ≤4 years	4277	30.6
High school	5681	40.7
Primary school	1864	13.3
Missing	205	1.5
Parents' marital status		
Married or living together	9255	66.3
Other	4600	32.9
Missing	109	0.8
Household income		
Very good or good	8732	62.5
Mediocre	4546	32.6
Poor	457	3.3
Missing	229	1.6
Status at follow-up:		
High school drop-out		
Total	4040	28.9
Girls	1668	23.8
Boys	2372	34.2

Table 2: Percentage of 15–16-year-olds reporting different health problems within type and level of reported health care use, all numbers stratified by gender (N=13964)

	Asthma		Allergy		Poor self-perceived health		Experienced serious illness/injury past 12 months		Pain sites ≥3 past 12 months		HSCL10≥1.6	
	Girls	Boys	Girls	Boys	Girls	Boys	Girls	Boys	Girls	Boys	Girls	Boys
	N *(%)*	N *(%)*	N *(%)*	N *(%)*	N *(%)*	N *(%)*	N *(%)*	N *(%)*	N *(%)*	N *(%)*	N *(%)*	N *(%)*
Total numbers reporting health problems	910 *(13.7)*	897 *(13.5)*	2756 *(41.0)*	2448 *(36.5)*	960 *(13.9)*	645 *(9.4)*	606 *(9.2)*	651 *(9.9)*	2683 *(40.4)*	1473 *(22.3)*	2390 *(35.2)*	906 *(13.4)*
Within self-reported level of health care use												
School health services												
None	565 *(12.7)*	726 *(13.2)*	1758 *(39.1)*	2008 *(36.1)*	556 *(12.1)*	492 *(8.7)*	351 *(8.0)*	498 *(9.1)*	1555 *(35.0)*	1135 *(20.7)*	1415 *(31.1)*	688 *(12.2)*
1-3	270 *(15.0)*	150 *(14.8)*	821 *(44.8)*	398 *(38.8)*	296 *(15.7)*	132*(12.5)*	189 *(10.6)*	133 *(13.3)*	894 *(48.8)*	298 *(29.7)*	750 *(40.3)*	194 *(18.9)*
≥4	63 *(20.7)*	8 *(13.3)*	150 *(48.1)*	20 *(35.1)*	86 *(26.8)*	10 *(16.7)*	54 *(17.9)*	11 *(19.3)*	201 *(65.3)*	24 *(41.4)*	200 *(63.3)*	22 *(36.7)*
Youth health clinic												
None	671 *(12.8)*	796 *(13.1)*	2093 *(39.6)*	2214 *(36.2)*	679 *(12.6)*	553 *(8.8)*	433 *(8.3)*	567 *(9.4)*	1922 *(36.8)*	1289 *(21.3)*	1709 *(32.1)*	786 *(12.7)*
1-3	183 *(16.3)*	79 *(16.9)*	533 *(46.5)*	191 *(40.6)*	201 *(16.9)*	70 *(14.4)*	138 *(12.5)*	68 *(14.8)*	591 *(51.8)*	150 (32.3)	524 *(44.7)*	103 *(21.5)*
≥4	49 (20.3)	5 *(13.5)*	114 *(46.5)*	11 *(30.6)*	67 *(26.4)*	7 *(18.4)*	34 *(14.3)*	7 *(19.4)*	150 *(61.7)*	13 *(36.1)*	146 *(57.9)*	12 *(33.3)*
General practitioner												
None	237 *(8.8)*	365 *(10.4)*	870 *(32.2)*	1128 *(31.9)*	258 *(9.3)*	301 *(8.3)*	108 *(4.1)*	192 *(5.5)*	805 *(30.2)*	605 *(17.3)*	796 *(29.2)*	437 *(12.2)*
1-3	485 *(15.6)*	410 *(15.6)*	1413 *(44.8)*	1074 *(40.7)*	466 *(14.4)*	255 *(9.4)*	284 *(9.2)*	314 *(12.0)*	1377 *(44.0)*	680 *(26.1)*	1155 *(36.3)*	373 *(13.9)*
≥4	178 *(22.8)*	105 *(24.4)*	450 *(56.2)*	208 *(47.5)*	223 *(27.1)*	73 *(16.2)*	211 *(27.4)*	137 *(32.2)*	480 *(60.2)*	163 *(38.6)*	422 *(51.7)*	90 *(20.4)*
Child and adolescent mental health services												
None	810 *(13.2)*	834 *(13.2)*	2499 *(40.3)*	2323 *(36.3)*	793 *(12.5)*	584 *(8.9)*	525 *(8.6)*	601 *(9.6)*	2383 *(38.8)*	1361 *(21.6)*	2046 *(32.6)*	803 *(12.4)*
≥1	87 *(19.5)*	47 *(19.5)*	238 *(51.7)*	96 *(39.8)*	147 *(31.5)*	46 *(18.5)*	76 *(17.7)*	43 *(18.5)*	272 *(60.0)*	90 *(37.5)*	323 *(69.5)*	96 *(40.5)*

Table 3: Health care seeking behaviour and health indicators in 15–16-year-olds and percentage of high school dropout 5 years later (N=13 964)

	Girls		Boys	
Self-reported level of health care use	N*(%)*	Dropout %	N*(%)*	Dropout %
School health services				
None	4690 *(67.7)*	22.2	5728 *(83.6)*	32.7
1-3	1917 *(27.7)*	24.6	1064 *(15.5)*	39.8
≥4	323 *(4.7)*	36.5	60 *(0.9)*	48.3
Youth health clinic				
None	5496 *(79.0)*	20.8	6314 *(92.3)*	32.8
1-3	1209 *(17.4)*	32.4	490 *(7.2)*	44.5
≥4	256 *(3.7)*	44.5	38 *(0.6)*	71.1
General practitioner				
None	2808 *(40.5)*	23.4	3653 *(53.4)*	36.8
1-3	3289 *(47.4)*	22.5	2729 *(39.9)*	29.8
≥4	841 *(12.1)*	27.8	453 *(6.6)*	36.0
Child and adolescent mental health services				
None	6463 *(93.1)*	21.8	6590 *(96.3)*	32.8
≥1	477 *(6.9)*	47.0	251 *(3.7)*	62.2
Health indicators				
Asthma				
None	5730 *(86.3)*	23.1	5753 *(86.5)*	33.3
Yes	910 *(13.7)*	27.1	897 *(13.5)*	37.9
Allergy				
None	3958 *(59.0)*	21.9	4261 *(63.5)*	33.5
Yes	2756 *(41.0)*	25.9	2448 *(36.5)*	34.4
Self-perceived health				
Very good/good	5932 *(86.1)*	21.8	6227 *(90.6)*	32.8
Not good/poor	960 *(13.9)*	36.8	645 *(9.4)*	46.8
Serious illness/injury past 12 months				
None	5956 *(90.8)*	23.1	5929 *(90.1)*	33.4
Yes	606 *(9.2)*	24.1	651 *(9.9)*	37.2
Pain sites reported past 12 months				
<3	3917 *(59.6)*	19.6	5107 *(77.7)*	31.6
≥3	2463 *(40.4)*	29.3	1385 *(22.3)*	42.2
HSCL10				
<1.6	4391 *(64.8)*	19.3	5848 *(86.6)*	31.8
≥1.6	2390 *(35.2)*	30.5	906 *(13.4)*	45.7
Sociodemographic variables				
Ethnicity				
Ethnic Norwegian	6115 *(87.1)*	22.5	6040 *(87.0)*	31.8
1st generation immigrant	580 *(8.3)*	36.7	546 *(7.9)*	53.7
2nd generation immigrant	324 *(4.6)*	25.0	359 *(5.2)*	43.7
Parents' marital status				
Married/living together	4655 *(66.6)*	18.4	4600 *(67.0)*	28.8
Other	2335 *(33.4)*	34.2	2265*(33.0)*	44.1
Household income				
Very good or good	4212 *(60.9)*	20.2	4520 *(66.2)*	31.9
Mediocre	2450 *(35.4)*	27.3	2096 *(30.7)*	36.2
Poor	250 *(3.6)*	45.6	207 *(3.0)*	48.3
Parents' educational level				
College/university degree >4 years	1001 *(14.5)*	7.6	936 *(13.7)*	12.8
College/university degree ≤4 years	2135 *(30.9)*	14.3	2142 *(31.3)*	24.2

Table 3: Health care seeking behaviour and health indicators in 15–16-year-olds and percentage of high school dropout 5 years later (N=13 964)

High school	2867 *(41.4)*	29.1	2814 *(41.1)*	39.5
Primary school	915 *(13.2)*	44.3	949 *(13.9)*	59.1

Table 3: Health care seeking behaviour and health indicators in 15–16-year-olds and percentage of high school dropout 5 years later (N=13 964)

Table 4: Associations between health care seeking behaviour evaluated in 10th grade adolescents and high school drop-out five years later. Investigated using multiple logistic regression analysis.

		Crude		Adjusted†	
		Girls	Boys	Girls	Boys
Self-reported level of health care use		OR (95% CI) ††	OR (95% CI)	OR (95% CI)	OR (95% CI)
School health services	None (ref)				
	1-3	**1.15 (1.01 to 1.30)***	**1.36 (1.19 to 1.56)*****	**0.82 (0.70 to 0.96)***	1.15 (0.97 to 1.36)
	≥4	**2.02 (1.59 to 2.56)*****	**1.93 (1.16 to 3.21)***	0.86 (0.63 to 1.17)	0.71 (0.37 to 1.36)
Youth health clinic	None (ref)				
	1-3	**1.83 (1.60 to 2.10)*****	**1.64 (1.36 to 1.97)*****	**1.72 (1.45 to 2.04)*****	1.16 (0.92 to 1.45)
	≥4	**3.06 (2.37 to 3.95)*****	**5.02 (2.48 to 10.14)*****	**1.99 (1.45 to 2.73)*****	**2.76 (1.24 to 6.13)***
General practitioner	None (ref)				
	1-3	0.95 (0.84 to 1.07)	**0.73 (0.65 to 0.81)*****	0.89 (0.77 to 1.03)	**0.69 (0.61 to 0.79)*****
	≥4	**1.26 (1.06 to 1.50)****	0.96 (0.79 to 1.18)	0.87 (0.69 to 1.10)	0.85 (0.66 to 1.09)
Child and adolescent mental health services	None (ref)				
	≥1	**3.18 (2.63 to 3.84)*****	**3.37 (2.60 to 4.37)*****	**2.04 (1.60 to 2.60)*****	**2.85 (2.07 to 3.93)****

† In the adjusted model use of each health service is adjusted for use of the other health care services, health indicators and sociodemographic variables

†† All associations expressed in odds ratios (OR) with 95% confidence intervalls (CI).

*** *significant relationship, p≤0.001*

** *significant relationship, p≤0.01*

* *significant relationship, p≤0.05*

STROBE Statement—Checklist of items that should be included in reports of ***cohort studies***

	Item No	Recommendation
Title and abstract	1	(*a*) Indicate the study's design with a commonly used term in the title or the abstract
		(*b*) Provide in the abstract an informative and balanced summary of what was done and what was found
Introduction		
Background/rationale	2	Explain the scientific background and rationale for the investigation being reported
Objectives	3	State specific objectives, including any prespecified hypotheses
Methods		
Study design	4	Present key elements of study design early in the paper
Setting	5	Describe the setting, locations, and relevant dates, including periods of recruitment, exposure, follow-up, and data collection
Participants	6	(*a*) Give the eligibility criteria, and the sources and methods of selection of participants. Describe methods of follow-up
		(*b*) For matched studies, give matching criteria and number of exposed and unexposed
Variables	7	Clearly define all outcomes, exposures, predictors, potential confounders, and effect modifiers. Give diagnostic criteria, if applicable
Data sources/ measurement	8*	For each variable of interest, give sources of data and details of methods of assessment (measurement). Describe comparability of assessment methods if there is more than one group
Bias	9	Describe any efforts to address potential sources of bias
Study size	10	Explain how the study size was arrived at
Quantitative variables	11	Explain how quantitative variables were handled in the analyses. If applicable, describe which groupings were chosen and why
Statistical methods	12	(*a*) Describe all statistical methods, including those used to control for confounding
		(*b*) Describe any methods used to examine subgroups and interactions
		(*c*) Explain how missing data were addressed
		(*d*) If applicable, explain how loss to follow-up was addressed
		(*e*) Describe any sensitivity analyses
Results		
Participants	13*	(a) Report numbers of individuals at each stage of study—eg numbers potentially eligible, examined for eligibility, confirmed eligible, included in the study, completing follow-up, and analysed
		(b) Give reasons for non-participation at each stage
		(c) Consider use of a flow diagram
Descriptive data	14*	(a) Give characteristics of study participants (eg demographic, clinical, social) and information on exposures and potential confounders
		(b) Indicate number of participants with missing data for each variable of interest
		(c) Summarise follow-up time (eg, average and total amount)
Outcome data	15*	Report numbers of outcome events or summary measures over time
Main results	16	(*a*) Give unadjusted estimates and, if applicable, confounder-adjusted estimates and their precision (eg, 95% confidence interval). Make clear which confounders were adjusted for and why they were included
		(*b*) Report category boundaries when continuous variables were categorized
		(*c*) If relevant, consider translating estimates of relative risk into absolute risk for a meaningful time period

Other analyses	17	Report other analyses done—eg analyses of subgroups and interactions, and sensitivity analyses
Discussion		
Key results	18	Summarise key results with reference to study objectives
Limitations	19	Discuss limitations of the study, taking into account sources of potential bias or imprecision. Discuss both direction and magnitude of any potential bias
Interpretation	20	Give a cautious overall interpretation of results considering objectives, limitations, multiplicity of analyses, results from similar studies, and other relevant evidence
Generalisability	21	Discuss the generalisability (external validity) of the study results
Other information		
Funding	22	Give the source of funding and the role of the funders for the present study and, if applicable, for the original study on which the present article is based

*Give information separately for exposed and unexposed groups.

Note: An Explanation and Elaboration article discusses each checklist item and gives methodological background and published examples of transparent reporting. The STROBE checklist is best used in conjunction with this article (freely available on the Web sites of PLoS Medicine at http://www.plosmedicine.org/, Annals of Internal Medicine at http://www.annals.org/, and Epidemiology at http://www.epidem.com/). Information on the STROBE Initiative is available at http://www.strobe-statement.org.

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Can use of health care services in 15–16-year-olds predict an increased level of high school dropout? A longitudinal community study.

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Can use of health care services among 15–16-year-olds predict an increased level of high school dropout? A longitudinal community study.

Lisbeth Homlong, Elin O. Rosvold, Ole R. Haavet

Department of General Practice, Institute of Health and Society, P.O. Box 1130, Blindern, N-0318 Oslo, University of Oslo, Norway,

Lisbeth Homlong, PhD candidate;

Elin O. Rosvold, professor;

Ole R. Haavet, associate professor.

Corresponding author:

Lisbeth Homlong

Mail: lisbeth.homlong@medisin.uio.no

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Article summary

Can use of health care services among 15–16-year-olds predict an increased level of high school dropout? A longitudinal community study.

Article focus

* To determine if health care seeking among 15–16-year-olds is associated with high school dropout five years later.

* To investigate the relationship between health care seeking behaviour and health among 15–16-year-olds and level of high school dropout five years later.

Key messages

* Adolescents who make contacts with the child and adolescent mental health services at age 15–16, are more likely than their peers to drop out of high school.

* Adolescents who attend youth health clinics have higher odds of becoming high school dropouts.

* Boys who visit a GP and girls who attend the school health services regularly are less likely to become high school dropouts.

Strengths and limitations

The results of this study are based on a large community study with a substantial number of participants, yielding a high response rate and few missing data. The prospective–longitudinal design provides a higher power than does a cross-sectional design, because we were able to observe a temporal order of events on an individual level. The baseline survey was conducted in six Norwegian counties in both urban and rural areas and encompasses the entire youth population in these regions. Thus, the adolescent study sample should be representative for a general youth population. Furthermore, the compulsory Norwegian registries linked to the baseline data provided us with complete, reliable follow-up material. The items addressed in the baseline questionnaire have some limitations, however. The help-seeking variables did not provide us with reasons for the adolescents' encounters with the health system. The questions concerning health lack information on the severity or chronicity of conditions. Self-reports can also engender an understimation of health service use and incomplete information on health – especially mental health problems and the use of mental health services.

ABSTRACT

Objectives: To study associations between health care seeking in 15–16-year-olds and high school dropout five years later.

Design: Longitudinal community study.

Setting: Data from a comprehensive youth health survey conducted

in 2000–2004, linked to data from national registries up to 2010.

Participants: 13 964 10th grade secondary school students in six Norwegian counties.

Main outcome measure: Logistic regression was used to compute odds ratios for high school dropout.

Results: The total proportion of students not completing high school five years after registering was 29% (girls 24%, boys 34%). Frequent attenders to school health services and youth health clinics at age 15–16 had a higher dropout rate (37/48% and 45/71%), compared with those with no (22/33% and 21/33%) or moderate use (25/40% and 32/45%). Adolescents referred to child and adolescent mental health services were also more likely to drop out (47/62%). Boys with moderate use of a general practitioner (GP) had a lower dropout rate (30%).

A multiple logistic regression analysis, in which we adjusted for selected health indicators and sociodemographic background variables, revealed that seeking help from the youth health clinic and consulting child and adolescent mental health services, were associated with increased level of high school dropout five years later. Frequent attenders (≥4 contacts) had the highest odds of dropping out. Yet boys who saw a GP and girls attending the school health

services 1–3 times over the previous year were less likely than their peers to drop out from high school.

Conclusions: Adolescents who seek help at certain health care services can be at risk of dropping out of high school later. Health workers should pay particular attention to frequent attenders and offer follow-up when needed. On the other hand, boys who attended a GP regularly were more likely to continue to high school graduation, which may indicate a protective effect of having a regular and stable relationship with a GP.

INTRODUCTION

Adolescents reporting poor health tend to have an underconsumption of health care facilities according to their expected need, hence a considerable proportion of them seem to have health problems not met by health care professionals. [1-3] Other studies have suggested that only a minority of adolescents with mental health problems seek health care for these reasons. [4, 5] Nevertheless, help seekers should be considered a vulnerable group. A US study has shown that disturbed adolescents more frequently seek help from professional health care services than do their non-disturbed peers. [6] Furthermore, adolescent frequent attenders to primary health care report more physical health complaints, more emotional problems and more days off school than do regular primary health care attenders. [7]

Poor mental and physical health are among several factors which can have an influence on help seeking behaviour and at adolescents' ability to graduate from high school. [8, 9] Although chronic disease in childhood has an impact on educational level and work participation in adult life, [10, 11] less is known about the effects of ill health during adolescent years. [9] An increasing load of mental health problems in young people, including depressive symptomatology, can play a role [12, 13] and several studies have shownassociations with failure to complete high school. [14, 15] In a recent Norwegian study, one out of five high school dropouts reported that they quit because of mental health problems. [16] Previous research indicates that teenage pregnancy and substance abuse are also associated with dropping out. [17, 18]

A substantial number of adolescents drop out of high school, placing themselves at higher risk of marginalisation later in life [8, 19] and generating considerable public attention in recent years. Norway and several other western countries experience the same challenges. In Norway, adolescents normally enrol in high school at age 15–16, immediately after finishing

10th grade, which is the last year of compulsory school. Students are supposed to complete high school within three years. Those who fail to graduate within five years after registering as students are defined as high school dropouts. A recent Norwegian study has shown that high school dropouts are at higher risk than their peers of receiving social security benefits five years later. [20] Previous studies have found a strong association between low educational level and early receipt of a disability pension. [11, 21] Education is a key to participation in adult work life, and high school graduation has a strong influence on future health and well-being. [8, 22]

The concept of marginalisation is often used to describe a process that in a worst case scenario can end up in permanent exclusion.[23] Dropping out of high school can be a first step in the process of marginalisation. High school dropout and marginalisation among young adults are fields that must be approached from different angles. Both individual characteristics and contextual factors related to family, friends, the community, the schools and the school system have an influence on dropout.

In our study we addressed the problem from a health-related perspective, by exploring if adolescents at risk had made contacts with the health services already at age 15–16. Help seeking behaviour cannot be explored without including health and sociodemographic background factors. As we consider help seekers a vulnerable group, the aim of our study was to determine if adolescent help seekers also have increased odds of high school dropout in a longitudinal perspective.

METHODS

Population

A large comprehensive health survey of all 10th grade secondary school students (aged 15–16) in six Norwegian counties, was conducted between 2000 and 2004. The youth survey was initiated in Oslo in 2000 and was extended to include five more counties in the following years 2001–2004. Originally 18 425 10th graders were invited to the baseline studies, while the overall response rate was 87% (n=15 966). The study was organised as a classroom survey, where the pupils filled out a written questionnaire during 2 school hours. An assistant was present to provide information to the participants and administer the questionnaires. Pupils not present at school at the day of the survey were left questionnaires at the schools to be filled out later. Those not responding, received a copy by mail to their home address along with a stamped return envelope.

Participation in the survey was voluntary and the pupils signed an informed consent in advance. The survey comprised questions about relationships with family, friends and school; physical and mental health; health behaviour; and life events. [24] More detailed information about the health survey is available on the website of the Norwegian Institute of Public Health. [25]

Questionnaire data from the study were linked to data from the National Education Registry and the National Insurance Services (NIS/FD-trygd), compulsory national databases which supply detailed information on the entire cohort up to the year 2010. A precise linkage of records was possible because of the national identification number given to every resident of Norway. After linkage by Statistics Norway, the national identification numbers were removed from the data sets and kept within a safe computer system to secure anonymity for each individual. At baseline, the adolescent contributors to the questionnaires were asked for

their consent to link the data from the questionnaires to national registers at a later date; 90% of the 15 966 in our baseline population agreed (n=14 062).

From the National Insurance Services we obtained information on participants who were granted an early permanent disability benefit (n=55) during the follow-up period. We excluded those individuals from the study, as a majority were diagnosed with mild to moderate mental retardation, diagnoses within the autistic spectrum; or severe psychiatric disorders like schizophrenia – conditions which were not compatible with high-school graduation.

Participants who died (n=43) during follow-up time were also excluded from the analyses, leaving us with a total study group of n=13 964.

Ethics

The study was approved by the Regional Committee for Medical and Health Research Ethics and by the Norwegian Data Inspectorate. These institutions gave permission for the use and linkage of the data. The adolescent participants gave a written consent to link their questionnaire data to national registers at a later date.

Table 1 about here

Variables

High-school dropouts

From the National Education registry, we gained information on adolescents who had failed to complete high school, which is the main outcome variable in this paper. In Norway, adolescents normally enroll in high-school at age 15–16, immediately after finishing 10th grade, which is the last year of compulsory schooling in Norway. Students are supposed to

complete high school within three years. Those who did not graduate within five years after registering as high-school students were defined for the purposes of this study as high-school-dropouts. [26]

Use of health-care services

In the baseline questionnaires, participants answered questions about help seeking from the health-care system over the 12 months prior to the survey, whether through school health services, youth health clinic, general practitioner (GP), or child and adolescent mental health services. The GP, the school health services and the youth health clinic in Norway are considered low-threshold parts of the primary health-care system, and are all free of charge for children and adolescents up to the age of 16. The services of child and adolescent mental health are paid for by the government, but a referral is required from a GP or another physician. To measure the use of health-care services, the contributors were given three response options – "none", "1–3" or "4 or more" – for number of contacts during the past year. In our analyses, we aggregated contacts with the child and adolescent mental health services into two categories: "none" or "1 or more" contacts. The *reason* for visiting any of the service providers was not measured in the questionnaires.

Health indicators

At baseline, adolescents were asked questions concerning their health, including direct questions on specific conditions. As adjustment variables we used the baseline questions addressing the adolescents' self-perceptions of the status of their general health, if they had or have had asthma or allergies, and conditions experienced in the 12 months prior to the survey: serious illness or injury; headache, abdominal pain, neck pain or shoulder pain, back pain or pain in extremities. The contributors could answer 'yes' or 'no' to these health and pain

questions. Self-rated health is a health measure which can predict later morbidity, mortality, health service use and early disability. [27] During adolescence, self-rated health status appears to be relatively stable, and it seems not to be changed by medical diagnoses or by mental or somatic health symptoms. [27] Self-rated health is considered to have good reliability for adults. [28] In the baseline questionnaire, self-rated health was categorised into four options: 'bad', 'not good', 'good' or 'very good'. In our analyses, we dichotomised this variable into two categories: 'very good or good' and 'not good or bad'. We also aggregated the pain variables into a dichotomous variable, in which three or more pain sites indicated a positive pain score and two or fewer indicated a negative pain score. We consider widespread pain to be an independent indicator of ill health. We also know from previous research that there is a certain comorbidity in adults between depressive disorders and chronic pain. [29] Level of mental health problems were scored using the Hopkin's Symptom Checklist-10 (HSCL-10), a short-form of the Hopkin's Symptom Checklist-25 (SCL-25), and an instrument designed to diagnose depression in primary health care. [30] The HSCL-10 includes ten questions about psychological symptoms experienced over the previous week and is validated for use both in general practice and in epidemiological studies. [31] A sum score above 1.6 indicates mild, moderate or severe depression among 14–16-year-olds.

Sociodemographics

The sociodemographic background variables concerning parents' marital situation and household income were based on self-reports from the baseline questionnaires. The pupils were asked whether their parents' were 'married/living together'; 'divorced/separated'; 'one or both dead'; or 'other'. We chose to dichotomise these options into 'married/living together' or 'other'. The question concerning household income were categorised into 'very good'; 'good'; 'mediocre'; or 'poor'. Here we chose to collapse 'very good' and 'good' into one

category, which we used as the reference category. Information on parents' educational level were provided by Statistics Norway. The highest accomplished educational level of one of the parents were used, leaving us with four categories: 'higher college or university degree' (>4 years); 'lower college or university degree'; 'high school'; or 'primary school'.

Statistical analyses

Analyses of the data set were performed using multiple logistic regression analysis in SPSS version 19.0, with high-school dropout as the outcome variable. In the crude model, we tested the variables concerning health service usage separately and odds ratios were computed for high-school dropout. In the adjusted model, use of health-care services were adjusted for each other, for the selected health indicators and for sociodemographic background variables. All analyses were stratified by gender.

RESULTS

Girls comprised 50.3% of our study group. Descriptive data of the population is presented in Table 1. Missing data caused by skipped questions concerning health-care seeking varied from 0.8% to 1.6%, while the questions on health had missing values from 1.1% to 6.5%. Follow-up data indicated that 28.9% of the students did not complete high school within five years (girls 23.8%, boys 34.2%). The descriptive baseline material revealed that 70% of the adolescents attended one or more health-care services over the previous year: school health services (girls 32.4%, boys 16.4%), youth health clinic (girls 21.1, boys 7.8%), GP (girls 59.5, boys 46.5%), child and adolescent mental health services (girls 6.9, boys 3.7%). Girls had substantially more contacts than did boys. A smaller number of the adolescents reported four or more contacts with school health services (girls 4.7, boys 0.9%) and the youth health clinic (girls 3.7, boys 0.6%), whereas 12.1% of the girls and 6.6% of the boys reported multiple contacts with a GP.

With few exceptions, adolescents who reported use of different health-care services during the past 12 months, generally reported more health problems, compared to those who reported no use of such health services (Table 2). Among frequent attenders (≥4 visits), a substantially higher percentage reported health problems compared to those with moderate use of services. This was the case for both girls and boys.

Table 2 about here

As shown in Table 3, a higher rate of high school dropouts were observed among frequent attenders to the school health services (girls 36.5%, boys 48.3%) and the youth health clinic (girls 44.5, boys 71.1%), compared to those with no or moderate use (1–3 visits). Also adolescents referred to the mental health service had a higher dropout rate (girls 47.0, boys 62.2%). Boys with moderate use of a GP, had a lower dropout rate (29.8%).

Table 3 about here

Table 4 shows that visiting the child and adolescent mental health services at age 15–16 was strongly associated with dropping out of high school five years later, in both genders (girls' odds ratio 3.18, 95% confidence interval 2.63 to 3.84; boys 3.37, 2.60 to 4.37). Likewise, seeking help at the youth health clinic (1–3 contacts: girls 1.83, 1.60 to 2.10; boys 1.64, 1.36 to 1.97. ≥4 contacts: girls 3.06, 2.37 to 3.95; boys 5.02, 2.48 to 10.14). The associations remained significant after adjustment for use of other health care services, health indicators and sociodemographic variables – except for boys with moderate use of the youth health clinic. In the unadjusted analyses, attending the school health services was associated with dropping out of high school (1–3: girls 1.15, 1.01 to 1.30; boys 1.36, 1.19 to 1.56. ≥4: girls 2.02, 1.59 to 2.56; boys 1.93, 1.16 to 3.21), while after adjustments in girls, moderate use of school health services had a slightly protective effect (0.82, 0.70 to 0.96).

Between 1and 3 contacts with the GP the previous year was associated with a lower level of high-school dropout in boys (0.73, 0.65 to 0.81). Boys who were regular users of a GP also had a significant lower dropout rate in the adjusted model.

Table 4 about here

DISCUSSION

Main findings

Results revealed that 15–16-year-olds who attended the youth health clinic and those who saw the child and adolescent mental health services were significantly more likely to drop out of high school five years later than were those who did not seek help at these services. We also found that use of school health services was related to high school dropout, in both genders, but not after adjustments had been made. On the contrary, girls who reported 1-3 contacts with the school-based clinic the past year, had a slightly better outcome. Also boys who attended a GP regularly were more likely to continue to high-school graduation, which may indicate a protective effect of having a regular and stable relationship with a GP.

Strengths and weaknesses

The substantial number of participants in geographical diverse areas, along with a high response rate and few missing data constitute strengths of this prospective community study. The adolescent study sample should be representative, therefore, for a general youth population. Furthermore, the compulsory Norwegian registries provided us with complete, reliable follow-up material. The prospective-longitudinal design provided the opportunity to observe a temporal order of events on an individual level, and it can be argued that the power is stronger compared to that of a cross-sectional design. One should be careful, however, not to draw conclusions about causal relationships, given the observational nature of the study.

The baseline survey was conducted in six Norwegian counties in both urban and rural areas and encompasses the entire youth population in these regions. Yet, because local variations in the accessibility of health-care services can influence help-seeking behaviour, our results may not be applicable in all settings.

One limitation of the questions concerning health – variables which were adjusted for in the analyses – is the lack of information they provide on the severity or chronicity of conditions. Furthermore, the help-seeking variables in the baseline survey provide no reasons for the adolescents' encounters with the health system. Self-reports can imply an underestimation of health service usage, especially use of mental health services. Other health problems than those adjusted for in our analyses could have influenced help-seeking behaviour and failure to complete high school. Yet disability benefits acquired at a young age were considered to have been the result of the most serious health disabilities, and were therefore excluded from our sample.

A recent validation study confirms that the HSCL-10 instrument, which we have used to measure mental health problems, is a suitable diagnostic tool for adolescents in this age group, and is also found to be appropriate for use in epidemiological studies. [31] Although our cutoff point of 1.6 has been validated as optimal for detecting mild, moderate and severe depression in 14–16-year-olds of both genders, [31] it can be argued that this cutoff may be low, and could thereby define an unreasonably large proportion of adolescents as depressed. [32, 33] Another constraint is lack of a measure of other types of mental health problems.

High-school dropout has been chosen as the outcome variable because it is an early marker for later work marginalisation and social exclusion. [11, 20, 21] Previous studies indicate that those who drop out of high school have a higher risk of becoming dependent on welfare benefits in adult life, including receipt of an early disability pension. [11, 34, 35] It can be argued that the five-year limit is strict, but it is consistent with other studies on school dropout, and few of those who fail to complete high school within five years succeed in finishing later. [26] [19]

Comparison with previous research

We do not imply that health service use in adolescence causes high-school dropout, rather that it is a proxy for problems which can be independent risk factors for dropout. Even though several studies confirm an under-use of health care among adolescents who struggle with somatic and mental health issues, [1, 36] both previous research [7] and the descriptive material in our study, as shown in Table 2, confirm that help seekers constitute a group which generally have a greater load of health problems compared to non-seekers, and should receive special attention. Both structural and individual factors influence help seeking. [36, 37] From previous research we know that such sociodemographic characteristics as economic status and parents' educational level influence both help seeking [2, 7] and high school graduation. [8, 19] Health complaints which commonly lead adolescents to seek help can also influence them to drop out. After correcting for such factors in our analyses, we found a negative outcome in adolescents seeking help at the youth health clinic and the mental health services, indicating that they have other challenges that can explain their higher probability of dropping out. On the other hand, help seekers may have resources and certain personal qualities that enable them to recognise and cope with their problems – a characteristic for which we cannot correct in the analyses. [3]

Youth health clinics in Norway provide free advice and prescriptions for birth control and treatment of sexually transmitted diseases. In addition, it is a low-threshold service centre where adolescents can consult a nurse or a physician about mental health issues. Visiting the youth health clinic multiple times at 15–16 years of age can indicate sexual debut at an early age. We know that adolescent pregnancy is a risk factor for lower educational achievement, [18] but less is known about early sexual activity in general and failure to complete high school. A previous study has shown associations between low academic achievement and

high level of externalising behaviour and early sexual debut in both genders. [38] A US study on adolescents receiving mental health treatment shows associations between both externalising and internalising psychiatric disorders and sexual risk-taking behaviour. [39] To the best of our knowledge, there is limited research on boys who attend the youth health clinic or similar services, and there are few boys in our sample with multiple encounters. Those who have multiple encounters, however, have a dropout rate above 70%. Our results indicate that health workers in youth health clinics should be aware of and offer follow-up to adolescents with multiple visits.

In the crude model, adolescent attenders to the school health services generally had a higher level of high school dropout. After adjustments, though, girls with moderate attendance turned out to have slightly lower odds for dropout. A recent US study has found an association between low to moderate use of school-based health centres and reduction of dropout for high school students, [40] a finding which is in line with our result. The American school-based health centres, however, offer a wider range of health services than do school health services in Norway, and are therefore not directly comparable.

We found that consulting the child and adolescent mental health services was associated with lower odds for graduating from high school. Because a referral is needed in order to see the mental health services, we argue that individuals who qualify for specialised therapy usually have relatively severe mental health problems. A previous study has shown that there is a dose-response association between help-seeking for mental health problems and symptom load of anxiety and depression. [41] Furthermore, early-onset mental disorders have been shown to be associated with lower educational attainment. [12, 13] It is not surprising, then, that the outcome in the group consulting mental health services at age 15–16 is less fortunate.

Boys who saw a GP regularly were more likely to graduate from high school than their peers, although there was no such statistically significant relationship for girls. This finding suggests that, for boys, having a stable relationship with a GP in their adolescent years can have a positive impact. Yet whereas we assume that the boys who use GP services are consulting for health problems and that they are helped in some way, they may also have individual resources which explain their better outcomes. Teenage boys have a substantially lower use of health-care services than girls do, including seeing a GP. [42] They are also more reluctant to seek help for emotional problems unless severely distressed. [37, 43]

Implications for policy and practice

Previous research confirms that adolescents have frequent encounters with the primary health-care services every year, [4, 44, 45] which is consistent with our findings. These contacts provide golden opportunities to uncover somatic health problems and mental distress. Health workers in the primary health-care services should pay particular attention to adolescents with multiple health service encounters and offer follow-up when needed. It is also important to refer to the specialist services when the severity of the condition calls for it. Our results may suggest that by the time adolescents are referred to second-line mental health services, their conditions are well entrenched and the prognosis is consequently more negative.

Youth health clinics are low-threshold services which are visited by a substantial number of adolescents every year – especially young girls. Considering the high probability of dropping out among attenders of this service, as shown in our study, health workers should be advised to focus particularly on these adolescents and the quality of their treatment.

Whereas girls report more health problems and a higher level of health service usage than boys do, they are more likely to graduate from high school – a divergence that calls for a

broader approach to the relationship between health and failure to complete high school. More research is needed to disentangle the role of health services in dealing with adolescent health and possible preventive potential for adolescents' symptom load and functional impairment in the following years.

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Ethical approval: The study was approved by the Norwegian Institute of Public Health, Statistics Norway, the Ministry of Education and Research and the Medical Ethics Committee. These institutions gave permission for the use and linkage of the data. The adolescent participants gave written consent to link their questionnaire data to national registers at a later date.

Data sharing: no additional data available.

WHAT IS ALREADY KNOWN ON THIS TOPIC

High school dropouts are at risk of later marginalisation.

Poor physical and mental health is related to dropping out fromhigh school.

Adolescents who use health care services constitute a vulnerable group.

WHAT THIS STUDY ADDS

Adolescents who see the child and adolescent mental health services at age 15, are more likely to drop out from high school, compared to their peers.

Adolescents who attend youth health clinics could be at risk of high school dropout.

Boys who attend a GP and girls who visit the school health clinic regularly are less likely to become high school dropouts.

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Table1 Descriptive characteristics of the study population (N=13964) at baseline, 2000–2004, and at follow-up, 2010.

At baseline:	N	%
Gender		
Girls	7019	50.3
Boys	6945	49.7
Sociodemographic characteristics		
Etnicity		
Ethnic Norwegian	12155	87.0
1st generation immigrant	1126	8.1
2nd generation immigrant	683	4.9
Parents' educational level		
College or university degree >4 years	1937	13.9
College or university degree ≤4 years	4277	30.6
High school	5681	40.7
Primary school	1864	13.3
Missing	205	1.5
Parents' marital status		
Married or living together	9255	66.3
Other	4600	32.9
Missing	109	0.8
Household income		
Very good or good	8732	62.5
Mediocre	4546	32.6
Poor	457	3.3
Missing	229	1.6
Status at follow-up:		
High school drop-out		
Total	4040	28.9
Girls	1668	23.8
Boys	2372	34.2

Table 2: Percentage of 15–16-year-olds reporting different health problems within type and level of reported health care use, all numbers stratified by gender (N=13964)

	Asthma		Allergy		Poor self-perceived health		Experienced serious illness/injury past 12 months		Pain sites ≥3 past 12 months		HSCL10≥1.6	
	Girls	Boys	Girls	Boys	Girls	Boys	Girls	Boys	Girls	Boys	Girls	Boys
	N *(%)*	N *(%)*	N *(%)*	N *(%)*	N *(%)*	N *(%)*	N *(%)*	N *(%)*	N *(%)*	N *(%)*	N *(%)*	N *(%)*
Total numbers reporting health problems	910 *(13.7)*	897 *(13.5)*	2756 *(41.0)*	2448 *(36.5)*	960 *(13.9)*	645 *(9.4)*	606 *(9.2)*	651 *(9.9)*	2683 *(40.4)*	1473 *(22.3)*	2390 *(35.2)*	906 *(13.4)*
Within self-reported level of health care use												
School health services												
None	565 *(12.7)*	726 *(13.2)*	1758 *(39.1)*	2008 *(36.1)*	556 *(12.1)*	492 *(8.7)*	351 *(8.0)*	498 *(9.1)*	1555 *(35.0)*	1135 *(20.7)*	1415 *(31.1)*	688 *(12.2)*
1-3	270 *(15.0)*	150 *(14.8)*	821 *(44.8)*	398 *(38.8)*	296 *(15.7)*	132*(12.5)*	189 *(10.6)*	133 *(13.3)*	894 *(48.8)*	298 *(29.7)*	750 *(40.3)*	194 *(18.9)*
≥4	63 *(20.7)*	8 *(13.3)*	150 *(48.1)*	20 *(35.1)*	86 *(26.8)*	10 *(16.7)*	54 *(17.9)*	11 *(19.3)*	201 *(65.3)*	24 *(41.4)*	200 *(63.3)*	22 *(36.7)*
Youth health clinic												
None	671 *(12.8)*	796 *(13.1)*	2093 *(39.6)*	2214 *(36.2)*	679 *(12.6)*	553 *(8.8)*	433 *(8.3)*	567 *(9.4)*	1922 *(36.8)*	1289 *(21.3)*	1709 *(32.1)*	786 *(12.7)*
1-3	183 *(16.3)*	79 *(16.9)*	533 *(46.5)*	191 *(40.6)*	201 *(16.9)*	70 *(14.4)*	138 *(12.5)*	68 *(14.8)*	591 *(51.8)*	150 (32.3)	524 *(44.7)*	103 *(21.5)*
≥4	49 (20.3)	5 *(13.5)*	114 *(46.5)*	11 *(30.6)*	67 *(26.4)*	7 *(18.4)*	34 *(14.3)*	7 *(19.4)*	150 *(61.7)*	13 *(36.1)*	146 *(57.9)*	12 *(33.3)*
General practitioner												
None	237 *(8.8)*	365 *(10.4)*	870 *(32.2)*	1128 *(31.9)*	258 *(9.3)*	301 *(8.3)*	108 *(4.1)*	192 *(5.5)*	805 *(30.2)*	605 *(17.3)*	796 *(29.2)*	437 *(12.2)*
1-3	485 *(15.6)*	410 *(15.6)*	1413 *(44.8)*	1074 *(40.7)*	466 *(14.4)*	255 *(9.4)*	284 *(9.2)*	314 *(12.0)*	1377 *(44.0)*	680 *(26.1)*	1155 *(36.3)*	373 *(13.9)*
≥4	178 *(22.8)*	105 *(24.4)*	450 *(56.2)*	208 *(47.5)*	223 *(27.1)*	73 *(16.2)*	211 *(27.4)*	137 *(32.2)*	480 *(60.2)*	163 *(38.6)*	422 *(51.7)*	90 *(20.4)*
Child and adolescent mental health services												
None	810 *(13.2)*	834 *(13.2)*	2499 *(40.3)*	2323 *(36.3)*	793 *(12.5)*	584 *(8.9)*	525 *(8.6)*	601 *(9.6)*	2383 *(38.8)*	1361 *(21.6)*	2046 *(32.6)*	803 *(12.4)*
≥1	87 *(19.5)*	47 *(19.5)*	238 *(51.7)*	96 *(39.8)*	147 *(31.5)*	46 *(18.5)*	76 *(17.7)*	43 *(18.5)*	272 *(60.0)*	90 *(37.5)*	323 *(69.5)*	96 *(40.5)*

Table 3: Health care seeking behaviour and health indicators in 15–16-year-olds and percentage of high school dropout 5 years later (N=13 964)

	Girls		Boys	
Self-reported level of health care use	N*(%)*	Dropout %	N*(%)*	Dropout %
School health services				
None	4690 *(67.7)*	22.2	5728 *(83.6)*	32.7
1-3	1917 *(27.7)*	24.6	1064 *(15.5)*	39.8
≥4	323 *(4.7)*	36.5	60 *(0.9)*	48.3
Youth health clinic				
None	5496 *(79.0)*	20.8	6314 *(92.3)*	32.8
1-3	1209 *(17.4)*	32.4	490 *(7.2)*	44.5
≥4	256 *(3.7)*	44.5	38 *(0.6)*	71.1
General practitioner				
None	2808 *(40.5)*	23.4	3653 *(53.4)*	36.8
1-3	3289 *(47.4)*	22.5	2729 *(39.9)*	29.8
≥4	841 *(12.1)*	27.8	453 *(6.6)*	36.0
Child and adolescent mental health services				
None	6463 *(93.1)*	21.8	6590 *(96.3)*	32.8
≥1	477 *(6.9)*	47.0	251 *(3.7)*	62.2
Health indicators				
Asthma				
None	5730 *(86.3)*	23.1	5753 *(86.5)*	33.3
Yes	910 *(13.7)*	27.1	897 *(13.5)*	37.9
Allergy				
None	3958 *(59.0)*	21.9	4261 *(63.5)*	33.5
Yes	2756 *(41.0)*	25.9	2448 *(36.5)*	34.4
Self-perceived health				
Very good/good	5932 *(86.1)*	21.8	6227 *(90.6)*	32.8
Not good/poor	960 *(13.9)*	36.8	645 *(9.4)*	46.8
Serious illness/injury past 12 months				
None	5956 *(90.8)*	23.1	5929 *(90.1)*	33.4
Yes	606 *(9.2)*	24.1	651 *(9.9)*	37.2
Pain sites reported past 12 months				
<3	3917 *(59.6)*	19.6	5107 *(77.7)*	31.6
≥3	2463 *(40.4)*	29.3	1385 *(22.3)*	42.2
HSCL10				
<1.6	4391 *(64.8)*	19.3	5848 *(86.6)*	31.8
≥1.6	2390 *(35.2)*	30.5	906 *(13.4)*	45.7
Sociodemographic variables				
Ethnicity				
Ethnic Norwegian	6115 *(87.1)*	22.5	6040 *(87.0)*	31.8
1st generation immigrant	580 *(8.3)*	36.7	546 *(7.9)*	53.7
2nd generation immigrant	324 *(4.6)*	25.0	359 *(5.2)*	43.7
Parents' marital status				
Married/living together	4655 *(66.6)*	18.4	4600 *(67.0)*	28.8
Other	2335 *(33.4)*	34.2	2265*(33.0)*	44.1
Household income				
Very good or good	4212 *(60.9)*	20.2	4520 *(66.2)*	31.9
Mediocre	2450 *(35.4)*	27.3	2096 *(30.7)*	36.2
Poor	250 *(3.6)*	45.6	207 *(3.0)*	48.3
Parents' educational level				
College/university degree >4 years	1001 *(14.5)*	7.6	936 *(13.7)*	12.8
College/university degree ≤4 years	2135 *(30.9)*	14.3	2142 *(31.3)*	24.2

Table 3: Health care seeking behaviour and health indicators in 15–16-year-olds and percentage of high school dropout 5 years later (N=13 964)

High school	2867 *(41.4)*	29.1	2814 *(41.1)*	39.5
Primary school	915 *(13.2)*	44.3	949 *(13.9)*	59.1

Table 3: Health care seeking behaviour and health indicators in 15–16-year-olds and percentage of high school dropout 5 years later (N=13 964)

Table 4: Associations between health care seeking behaviour evaluated in 10th grade adolescents and high school drop-out five years later. Investigated using multiple logistic regression analysis.

		Crude		Adjusted†	
		Girls	Boys	Girls	Boys
Self-reported level of health care use		OR (95% CI) ††	OR (95% CI)	OR (95% CI)	OR (95%
School health services	None (ref)				
	1-3	**1.15 (1.01 to 1.30)***	**1.36 (1.19 to 1.56)*****	**0.82 (0.70 to 0.96)***	1.15 (0.97 to 1.36)
	≥4	**2.02 (1.59 to 2.56)*****	**1.93 (1.16 to 3.21)***	0.86 (0.63 to 1.17)	0.71 (0.37 to 1.36)
Youth health clinic	None (ref)				
	1-3	**1.83 (1.60 to 2.10)*****	**1.64 (1.36 to 1.97)*****	**1.72 (1.45 to 2.04)*****	1.16 (0.92 to 1.45)
	≥4	**3.06 (2.37 to 3.95)*****	**5.02 (2.48 to 10.14)*****	**1.99 (1.45 to 2.73)*****	**2.76 (1.24 to 6.13)***
General practitioner	None (ref)				
	1-3	0.95 (0.84 to 1.07)	**0.73 (0.65 to 0.81)*****	0.89 (0.77 to 1.03)	**0.69 (0.61 to 0.79)*****
	≥4	**1.26 (1.06 to 1.50)****	0.96 (0.79 to 1.18)	0.87 (0.69 to 1.10)	0.85 (0.66 to 1.09)
Child and adolescent mental health services	None (ref)				
	≥1	**3.18 (2.63 to 3.84)*****	**3.37 (2.60 to 4.37)*****	**2.04 (1.60 to 2.60)*****	**2.85 (2.07 to 3.93)****

† In the adjusted model use of each health service is adjusted for use of the other health care services, health indicators and sociodemographic variables

†† All associations expressed in odds ratios (OR) with 95% confidence intervalls (CI).

*** *significant relationship, p≤0.001*

** *significant relationship, p≤0.01*

* *significant relationship, p≤0.05*

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STROBE Statement—Checklist of items that should be included in reports of ***cohort studies***

	Item No	Recommendation
Title and abstract	1	(*a*) Indicate the study's design with a commonly used term in the title or the abstract
		(*b*) Provide in the abstract an informative and balanced summary of what was done and what was found
Introduction		
Background/rationale	2	Explain the scientific background and rationale for the investigation being reported
Objectives	3	State specific objectives, including any prespecified hypotheses
Methods		
Study design	4	Present key elements of study design early in the paper
Setting	5	Describe the setting, locations, and relevant dates, including periods of recruitment, exposure, follow-up, and data collection
Participants	6	(*a*) Give the eligibility criteria, and the sources and methods of selection of participants. Describe methods of follow-up
		(*b*) For matched studies, give matching criteria and number of exposed and unexposed
Variables	7	Clearly define all outcomes, exposures, predictors, potential confounders, and effect modifiers. Give diagnostic criteria, if applicable
Data sources/ measurement	8*	For each variable of interest, give sources of data and details of methods of assessment (measurement). Describe comparability of assessment methods if there is more than one group
Bias	9	Describe any efforts to address potential sources of bias
Study size	10	Explain how the study size was arrived at
Quantitative variables	11	Explain how quantitative variables were handled in the analyses. If applicable, describe which groupings were chosen and why
Statistical methods	12	(*a*) Describe all statistical methods, including those used to control for confounding
		(*b*) Describe any methods used to examine subgroups and interactions
		(*c*) Explain how missing data were addressed
		(*d*) If applicable, explain how loss to follow-up was addressed
		(*e*) Describe any sensitivity analyses
Results		
Participants	13*	(a) Report numbers of individuals at each stage of study—eg numbers potentially eligible, examined for eligibility, confirmed eligible, included in the study, completing follow-up, and analysed
		(b) Give reasons for non-participation at each stage
		(c) Consider use of a flow diagram
Descriptive data	14*	(a) Give characteristics of study participants (eg demographic, clinical, social) and information on exposures and potential confounders
		(b) Indicate number of participants with missing data for each variable of interest
		(c) Summarise follow-up time (eg, average and total amount)
Outcome data	15*	Report numbers of outcome events or summary measures over time
Main results	16	(*a*) Give unadjusted estimates and, if applicable, confounder-adjusted estimates and their precision (eg, 95% confidence interval). Make clear which confounders were adjusted for and why they were included
		(*b*) Report category boundaries when continuous variables were categorized
		(*c*) If relevant, consider translating estimates of relative risk into absolute risk for a meaningful time period

Other analyses	17	Report other analyses done—eg analyses of subgroups and interactions, and sensitivity analyses
Discussion		
Key results	18	Summarise key results with reference to study objectives
Limitations	19	Discuss limitations of the study, taking into account sources of potential bias or imprecision. Discuss both direction and magnitude of any potential bias
Interpretation	20	Give a cautious overall interpretation of results considering objectives, limitations, multiplicity of analyses, results from similar studies, and other relevant evidence
Generalisability	21	Discuss the generalisability (external validity) of the study results
Other information		
Funding	22	Give the source of funding and the role of the funders for the present study and, if applicable, for the original study on which the present article is based

*Give information separately for exposed and unexposed groups.

Note: An Explanation and Elaboration article discusses each checklist item and gives methodological background and published examples of transparent reporting. The STROBE checklist is best used in conjunction with this article (freely available on the Web sites of PLoS Medicine at http://www.plosmedicine.org/, Annals of Internal Medicine at http://www.annals.org/, and Epidemiology at http://www.epidem.com/). Information on the STROBE Initiative is available at http://www.strobe-statement.org.

Can use of health care services among 15–16-year-olds predict an increased level of high school dropout? A longitudinal community study.

Lisbeth Homlong, Elin O. Rosvold, Ole R. Haavet

Department of General Practice, Institute of Health and Society, P.O. Box 1130, Blindern, N-0318 Oslo, University of Oslo, Norway,

Lisbeth Homlong, PhD candidate;

Elin O. Rosvold, professor;

Ole R. Haavet, associate professor.

Corresponding author:

Lisbeth Homlong

Mail: lisbeth.homlong@medisin.uio.no

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Article summary

Can use of health care services among 15–16-year-olds predict an increased level of high school dropout? A longitudinal community study.

Article focus

* To determine if health care seeking among 15–16-year-olds is associated with high school dropout five years later.

* To investigate the relationship between health care seeking behaviour and health among 15–16-year-olds and level of high school dropout five years later.

Key messages

* Adolescents who make contacts with the child and adolescent mental health services at age 15–16, are more likely than their peers to drop out of high school.

* Adolescents who attend ~~-~~ youth health clinics have higher odds of becoming ~~and school health services could be at risk of~~ high school dropouts.

* Boys who visit a GP and girls who attend the school health services regularly are less likely to become high school dropouts.

Strengths and limitations

The results of this study are based on a large community study with a substantial number of participants, yielding a high response rate and few missing data. The prospective–longitudinal design provides a higher power than does a cross-sectional design, because we were able to observe a temporal order of events on an individual level. The baseline survey was conducted in six Norwegian counties in both urban and rural areas and encompasses the entire youth population in these regions. Thus, the adolescent study sample should be representative for a general youth population. Furthermore, the compulsory Norwegian registries linked to the baseline data provided us with complete, reliable follow-up material. The items addressed in the baseline questionnaire have some limitations, however. The help-seeking variables did not provide us with reasons for the adolescents' encounters with the health system. The questions concerning health lack information on the severity or chronicity of conditions. Self-reports can also engender an understimation of health service use and incomplete information on health – especially mental health problems and the use of mental health services.

ABSTRACT

Objectives: To study associations between health care seeking in 15–16-year-olds and high school dropout five years later.

Design: Longitudinal community study.

Setting: Data from a comprehensive youth health survey conducted

in 2000–2004, linked to data from national registries up to 2010.

Participants: 13 964 10th grade secondary school students in six Norwegian counties.

Main outcome measure: Logistic regression was used to compute odds ratios for high school dropout.

Results: The total proportion of students not completing high school five years after registering was 29% (girls 24%, boys 34%). Frequent attenders to school health services and youth health clinics at age 15–16 had a higher dropout rate (37/48% and 45/71%), compared with those with no (22/33% and 21/33%) or moderate use (25/40% and 32/45%). Adolescents referred to child and adolescent mental health services were also more likely to drop out (47/62%). Boys with moderate use of a general practitioner (GP) had a lower dropout rate (30%).

A multiple logistic regression analysis, in which we adjusted for selected health indicators and sociodemographic background variables, revealed that seeking help from the youth health clinic and consulting child and adolescent mental health services, were associated with increased ~~odds~~ level of high school dropout five years later. Frequent attenders (≥4 contacts) had the highest odds of dropping out. Yet boys who saw a GP and girls attending the school

health services 1–3 times over the previous year were less likely than their peers to drop out from high school.

Conclusions: Adolescents who seek help at certain health care services can be at risk of dropping out of high school later. Health workers should pay particular attention to frequent attenders and offer follow-up when needed. On the other hand, boys who attended a GP regularly were more likely to continue to high school graduation, which may indicate a protective effect of having a regular and stable relationship with a GP.

INTRODUCTION

Adolescents reporting poor health tend to have an underconsumption of health care facilities according to their expected need, hence ~~and due to this~~ a considerable proportion of them seem to have health problems not met by health care professionals. [1-3] Other studies have suggested that only a minority of adolescents with mental health problems seek health care for these reasons. [4, 5] Nevertheless, help seekers should be considered a vulnerable group. A US study has shown that disturbed adolescents more frequently seek help from professional health care services than do their non-disturbed peers. [6] Furthermore, adolescent frequent attenders to primary health care report more physical health complaints, more emotional problems and more days off school than do regular primary health care attenders. [7]

Poor mental and physical health are among several factors which can have an influence on help seeking behaviour and at adolescents' ability to graduate from high school. [8, 9] Although chronic disease in childhood has an impact on educational level and work participation in adult life, [10, 11] less is known about the effects of ill health during adolescent years. [9] An increasing load of mental health problems in young people, including depressive symptomatology, can play a role [12, 13] and several studies have shown ~~an~~ associations with failure to complete high school. [14, 15] In a recent Norwegian study, one out of five high school dropouts reported that they quit because of mental health problems. [16] Previous research indicates that teenage pregnancy and substance abuse are also associated with dropping out. [17, 18]

A substantial number of adolescents drop out of high school, placing themselves at higher risk of marginalisation later in life [8, 19] and generating considerable public attention in recent years. Norway and several other western countries experience the same challenges. In Norway, adolescents normally enrol in high school at age 15–16, immediately after finishing

10th grade, which is the last year of compulsory school. Students are supposed to complete high school within three years. Those who fail to graduate within five years after registering as students are defined as high school dropouts. A recent Norwegian study has shown that high school dropouts are at higher risk than their peers of receiving social security benefits five years later. [20] Previous studies have found a strong association between low educational level and early receipt of a disability pension. [11, 21] Education is a key to participation in adult work life, and high school graduation has a strong influence on future health and well-being. [8, 22]

The concept of marginalisation is often used to describe a process that in a worst case scenario can end up in permanent exclusion.[23] Dropping out of high school can be a first step in the process of marginalisation. High school dropout and marginalisation among young adults are fields that must be approached from different angles. Both individual characteristics and contextual factors related to family, friends, the community, the schools and the school system have an influence on dropout.

In our study we addressed the problem from a health-related perspective, by exploring if adolescents at risk had made contacts with the health services already at age 15–16. Help seeking behaviour cannot be explored without including health and sociodemographic background factors. As we consider help seekers a vulnerable group, the aim of our study was to determine if adolescent help seekers also have increased odds of high school dropout in a longitudinal perspective. ~~We wanted to investigate this by exploring relationships between health-care-seeking behaviour and health in 15–16-year-olds and level of high school dropout five years later.~~

METHODS

Population

A large comprehensive health survey of all 10th grade secondary school students (aged 15–16) in six Norwegian counties, was conducted between 2000 and 2004. The youth survey was initiated in Oslo in 2000 and was extended to include five more counties in the following years 2001–2004. Originally 18 425 10th graders were invited to the baseline studies, while the overall response rate was 87% (n=15 966). The study was organised as a classroom survey, where the pupils filled out a written questionnaire during 2 school hours. An assistant was present to provide information to the participants and administer the questionnaires. Pupils not present at school at the day of the survey were left questionnaires at the schools to be filled out later. Those not responding, received a copy by mail to their home address along with a stamped return envelope.

Participation in the survey was voluntary and the pupils signed an informed consent in advance. The survey comprised questions about relationships with family, friends and school; physical and mental health; health behaviour; and life events. [24] More detailed information about the health survey is available on the website of the Norwegian Institute of Public Health. [25]

Questionnaire data from the study were linked to data from the National Education Registry and the National Insurance Services (NIS/FD-trygd), compulsory national databases which supply detailed information on the entire cohort up to the year 2010. A precise linkage of records was possible because of the national identification number given to every resident of Norway. After linkage by Statistics Norway, the national identification numbers were removed from the data sets and kept within a safe computer system to secure anonymity for each individual. At baseline, the adolescent contributors to the questionnaires were asked for

their consent to link the data from the questionnaires to national registers at a later date; 90% of the 15 966 in our baseline population agreed (n=14 062).

From the National Insurance Services we obtained information on participants who were granted an early permanent disability benefit (n=55) during the follow-up period. We excluded those individuals from the study, as a majority were diagnosed with mild to moderate mental retardation, diagnoses within the autistic spectrum; or severe psychiatric disorders like schizophrenia – conditions which were not compatible with high-school graduation.

Participants who died (n=43) during follow-up time were also excluded from the analyses, leaving us with a total study group of n=13 964.

Ethics

The study was approved by the Regional Committee for Medical and Health Research Ethics and by the Norwegian Data Inspectorate. These institutions gave permission for the use and linkage of the data. The adolescent participants gave a written consent to link their questionnaire data to national registers at a later date.

Table 1 about here

Variables

High-school dropouts

From the National Education registry, we gained information on adolescents who had failed to complete high school, which is the main outcome variable in this paper. In Norway, adolescents normally enroll in high-school at age 15–16, immediately after finishing 10th grade, which is the last year of ~~obligatory~~ compulsory schooling in Norway. Students are

supposed to complete high school within three years. Those who did not graduate within five years after registering as high-school students were defined for the purposes of this study as high-school-dropouts. [26]

Use of health-care services

In the baseline questionnaires, participants answered questions about help seeking from the health-care system over the 12 months prior to the survey, whether through school health services, youth health clinic, general practitioner (GP), or child and adolescent mental health services. The GP, the school health services and the youth health clinic in Norway are considered low-threshold parts of the primary health-care system, and are all free of charge for children and adolescents up to the age of 16. The services of child and adolescent mental health are paid for by the government, but a referral is required from a GP or another physician. To measure the use of health-care services, the contributors were given three response options – "none", "1–3" or "4 or more" – for number of contacts during the past year. In our analyses, we aggregated contacts with the child and adolescent mental health services into two categories: "none" or "1 or more" contacts. The *reason* for visiting any of the service providers was not measured in the questionnaires.

Health indicators

At baseline, adolescents were asked questions concerning their health, including direct questions on specific conditions. As adjustment variables we used the baseline questions addressing the adolescents' self-perceptions of the status of their general health, if they had or have had asthma or allergies, and conditions experienced in the 12 months prior to the survey: serious illness or injury; headache, abdominal pain, neck pain or shoulder pain, back pain or pain in extremities. The contributors could answer 'yes' or 'no' to these health and pain

questions. Self-rated health is a health measure which can predict later morbidity, mortality, health service use and early disability. [27] During adolescence, self-rated health status appears to be relatively stable, and it seems not to be changed by medical diagnoses or by mental or somatic health symptoms. [27] Self-rated health is considered to have good reliability for adults. [28] In the baseline questionnaire, self-rated health was categorised into four options: 'bad', 'not good', 'good' or 'very good'. In our analyses, we dichotomised this variable into two categories: 'very good or good' and 'not good or bad'. We also aggregated the pain variables into a dichotomous variable, in which three or more pain sites indicated a positive pain score and two or fewer indicated a negative pain score. We consider widespread pain to be an independent indicator of ill health. We also know from previous research that there is a certain comorbidity in adults between depressive disorders and chronic pain. [29] Level of mental health problems were scored using the Hopkin's Symptom Checklist-10 (HSCL-10), a short-form of the Hopkin's Symptom Checklist-25 (SCL-25), and an instrument designed to diagnose depression in primary health care. [30] The HSCL-10 includes ten questions about psychological symptoms experienced over the previous week and is validated for use both in general practice and in epidemiological studies. [31] A sum score above 1.6 indicates mild, moderate or severe depression among 14–16-year-olds.

Sociodemographics

The sociodemographic background variables concerning parents' marital situation and household income were based on self-reports from the baseline questionnaires. The pupils were asked whether their parents' were 'married/living together'; 'divorced/separated'; 'one or both dead'; or 'other'. We chose to dichotomise these options into 'married/living together' or 'other'. The question concerning household income were categorised into 'very good'; 'good'; 'mediocre'; or 'poor'. Here we chose to collapse 'very good' and 'good' into one

category, which we used as the reference category. Information on parents' educational level were provided by Statistics Norway. The highest accomplished educational level of one of the parents were used, leaving us with four categories: 'higher college or university degree' (>4 years); 'lower college or university degree'; 'high school'; or 'primary school'.

Statistical analyses

Analyses of the data set were performed using multiple logistic regression analysis in SPSS version 19.0, with high-school dropout as the outcome variable. In the crude model, we tested the variables concerning health service usage separately and odds ratios were computed for high-school dropout. In the adjusted model, use of health-care services were adjusted for each other, for the selected health indicators and for sociodemographic background variables. All analyses were stratified by gender.

RESULTS

Girls comprised 50.3% of our study group. Descriptive data of the population is presented in Table 1. Missing data caused by skipped questions concerning health-care seeking varied from 0.8% to 1.6%, while the questions on health had missing values from 1.1% to 6.5%. Follow-up data indicated that 28.9% of the students did not complete high school within five years (girls 23.8%, boys 34.2%). The descriptive baseline material revealed that 70% of the adolescents attended one or more health-care services over the previous year: school health services (girls 32.4%, boys 16.4%), youth health clinic (girls 21.1, boys 7.8%), GP (girls 59.5, boys 46.5%), child and adolescent mental health services (girls 6.9, boys 3.7%). Girls had substantially more contacts than did boys. A smaller number of the adolescents reported four or more contacts with school health services (girls 4.7, boys 0.9%) and the youth health clinic (girls 3.7, boys 0.6%), whereas 12.1% of the girls and 6.6% of the boys reported multiple contacts with a GP.

With few exceptions, adolescents who reported use of different health-care services during the past 12 months, generally reported more health problems, compared to those who reported no use of such health services (Table 2). Among frequent attenders (≥4 visits), a substantially higher percentage reported health problems compared to those with moderate use of services. This was the case for both girls and boys.

Table 2 about here

As shown in Table 3, a higher rate of high school dropouts were observed among frequent attenders to the school health services (girls 36.5%, boys 48.3%) and the youth health clinic (girls 44.5, boys 71.1%), compared to those with no or moderate use (1–3 visits). Also adolescents referred to the mental health service had a higher dropout rate (girls 47.0, boys 62.2%). Boys with moderate use of a GP, had a lower dropout rate (29.8%).

Table 3 about here

Table 4 shows that visiting the child and adolescent mental health services at age 15–16 was strongly associated with dropping out of high school five years later, in both genders (girls' odds ratio 3.18, 95% confidence interval 2.63 to 3.84; boys 3.37, 2.60 to 4.37). Likewise, seeking help at the youth health clinic (1–3 contacts: girls 1.83, 1.60 to 2.10; boys 1.64, 1.36 to 1.97. ≥4 contacts: girls 3.06, 2.37 to 3.95; boys 5.02, 2.48 to 10.14). The associations remained significant after adjustment for use of other health care services, health indicators and sociodemographic variables – except for boys with moderate use of the youth health clinic. In the unadjusted analyses, attending the school health services was associated with dropping out of high school (1–3: girls 1.15, 1.01 to 1.30; boys 1.36, 1.19 to 1.56. ≥4: girls 2.02, 1.59 to 2.56; boys 1.93, 1.16 to 3.21), while after adjustments in girls, moderate use of school health services had a slightly protective effect (0.82, 0.70 to 0.96).

Between 1and 3 contacts with the GP the previous year was associated with a lower level of high-school dropout in boys (0.73, 0.65 to 0.81). Boys who were regular users of a GP also had a significant lower dropout rate in the adjusted model.

Table 4 about here

DISCUSSION

Main findings

Results revealed that 15–16-year-olds who attended the youth health clinic and those who saw the child and adolescent mental health services were significantly more likely to drop out of high school five years later than were those who did not seek help at these services. We also found that use of school health services was related to high school dropout, in both genders, but not after adjustments had been made. On the contrary, girls who reported 1-3 contacts with the school-based clinic the past year, had a slightly better outcome. Also boys who attended a GP regularly were more likely to continue to high-school graduation, which may indicate a protective effect of having a regular and stable relationship with a GP.

Strengths and weaknesses

The substantial number of participants in geographical diverse areas, along with a high response rate and few missing data constitute strengths of this prospective community study. The adolescent study sample should be representative, therefore, for a general youth population. Furthermore, the compulsory Norwegian registries provided us with complete, reliable follow-up material. The prospective-longitudinal design provided the opportunity to observe a temporal order of events on an individual level, and it can be argued that the power is stronger compared to that of a cross-sectional design. One should be careful, however, not to draw conclusions about causal relationships, given the observational nature of the study.

The baseline survey was conducted in six Norwegian counties in both urban and rural areas and encompasses the entire youth population in these regions. Yet, because local variations in the accessibility of health-care services can influence help-seeking behaviour, our results may not be applicable in all settings.

One limitation of the questions concerning health – variables which were adjusted for in the analyses – is the lack of information they provide on the severity or chronicity of conditions. Furthermore, the help-seeking variables in the baseline survey provide no reasons for the adolescents' encounters with the health system. Self-reports can imply an underestimation of health service usage, especially use of mental health services. Other health problems than those adjusted for in our analyses could have influenced help-seeking behaviour and failure to complete high school. Yet disability benefits acquired at a young age were considered to have been the result of the most serious health disabilities, and were therefore excluded from our sample.

A recent validation study confirms that the HSCL-10 instrument, which we have used to measure mental health problems, is a suitable diagnostic tool for adolescents in this age group, and is also found to be appropriate for use in epidemiological studies. [31] Although our cutoff point of 1.6 has been validated as optimal for detecting mild, moderate and severe depression in 14–16-year-olds of both genders, [31] it can be argued that this cutoff may be low, and could thereby define an unreasonably large proportion of adolescents as depressed. [32, 33] Another constraint is lack of a measure of other types of mental health problems.

High-school dropout has been chosen as the outcome variable because it is an early marker for later work marginalisation and social exclusion. [11, 20, 21] Previous studies indicate that those who drop out of high school have a higher risk of becoming dependent on welfare benefits in adult life, including receipt of an early disability pension. [11, 34, 35] It can be argued that the five-year limit is strict, but it is consistent with other studies on school dropout, and few of those who fail to complete high school within five years succeed in finishing later. [26] [19]

Comparison with previous research

We do not imply that health service use in adolescence causes high-school dropout, rather that it is a proxy for problems which can be independent risk factors for dropout. Even though several studies confirm an under-use of health care among adolescents who struggle with somatic and mental health issues, [1, 36] both previous research [7] and the descriptive material in our study, as shown in Table 2, confirm that help seekers constitute a group which generally have a greater load of health problems compared to non-seekers, and should receive special attention. Both structural and individual factors influence help seeking. [36, 37] From previous research we know that such sociodemographic characteristics as economic status and parents' educational level influence both help seeking [2, 7] and high school graduation. [8, 19] Health complaints which commonly lead adolescents to seek help can also influence them to drop out. After correcting for such factors in our analyses, we found a negative outcome in adolescents seeking help at the youth health clinic and the mental health services, indicating that they have other challenges that can explain their higher probability of dropping out. On the other hand, help seekers may have resources and certain personal qualities that enable them to recognise and cope with their problems – a characteristic for which we cannot correct in the analyses. [3]

Youth health clinics in Norway provide free advice and prescriptions for birth control and treatment of sexually transmitted diseases. In addition, it is a low-threshold service centre where adolescents can consult a nurse or a physician about mental health issues. Visiting the youth health clinic multiple times at 15–16 years of age can indicate sexual debut at an early age. We know that adolescent pregnancy is a risk factor for lower educational achievement, [18] but less is known about early sexual activity in general and failure to complete high school. A previous study has shown associations between low academic achievement and

high level of externalising behaviour and early sexual debut in both genders. [38] A US study on adolescents receiving mental health treatment shows associations between both externalising and internalising psychiatric disorders and sexual risk-taking behaviour. [39] To the best of our knowledge, there is limited research on boys who attend the youth health clinic or similar services, and there are few boys in our sample with multiple encounters. Those who have multiple encounters, however, have a dropout rate above 70%. Our results indicate that health workers in youth health clinics should be aware of and offer follow-up to adolescents with multiple visits.

In the crude model, adolescent attenders to the school health services generally had a higher level of high school dropout. After adjustments, though, girls with moderate attendance turned out to have slightly lower odds for dropout. A recent US study has found an association between low to moderate use of school-based health centres and reduction of dropout for high school students, [40] a finding which is in line with our result. The American school-based health centres, however, offer a wider range of health services than do school health services in Norway, and are therefore not directly comparable.

We found that consulting the child and adolescent mental health services was associated with lower odds for graduating from high school. Because a referral is needed in order to see the mental health services, we argue that individuals who qualify for specialised therapy usually have relatively severe mental health problems. A previous study has shown that there is a dose-response association between help-seeking for mental health problems and symptom load of anxiety and depression. [41] Furthermore, early-onset mental disorders have been shown to be associated with lower educational attainment. [12, 13] It is not surprising, then, that the outcome in the group consulting mental health services at age 15–16 is less fortunate.

Boys who saw a GP regularly were more likely to graduate from high school than their peers, although there was no such statistically significant relationship for girls. This finding suggests that, for boys, having a stable relationship with a GP in their adolescent years can have a positive impact. Yet whereas we assume that the boys who use GP services are consulting for health problems and that they are helped in some way, they may also have individual resources which explain their better outcomes. Teenage boys have a substantially lower use of health-care services than girls do, including seeing a GP. [42] They are also more reluctant to seek help for emotional problems unless severely distressed. [37, 43]

Implications for policy and practice

Previous research confirms that adolescents have frequent encounters with the primary health-care services every year, [4, 44, 45] which is consistent with our findings. These contacts provide golden opportunities to uncover somatic health problems and mental distress. Health workers in the primary health-care services should pay particular attention to adolescents with multiple health service encounters and offer follow-up when needed. It is also important to refer to the specialist services when the severity of the condition calls for it. Our results ~~clearly show~~ may suggest that by the time adolescents are referred to second-line mental health services, their conditions are well entrenched and the prognosis is consequently more negative.

Youth health clinics are low-threshold services which are visited by a substantial number of adolescents every year – especially young girls. Considering the high probability of dropping out among attenders of this service, as shown in our study, health workers should be advised to focus particularly on these adolescents and the ~~content~~ quality of their treatment.

Whereas girls report more health problems and a higher level of health service usage than boys do, they are more likely to graduate from high school – a divergence~~dilatation~~ that calls for a broader approach to the relationship between health and failure to complete high school. More research is needed to disentangle the role of health services in dealing with adolescent health and possible preventive potential for adolescents' symptom load and functional impairment in the following years.

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Ethical approval: The study was approved by the Norwegian Institute of Public Health, Statistics Norway, the Ministry of Education and Research and the Medical Ethics Committee. These institutions gave permission for the use and linkage of the data. The adolescent participants gave written consent to link their questionnaire data to national registers at a later date.

Data sharing: no additional data available.

WHAT IS ALREADY KNOWN ON THIS TOPIC

High school dropouts are at risk of later marginalisation.

Poor physical and mental health is related to dropping out fromhigh school.

Adolescents who use health care services constitute a vulnerable group.

WHAT THIS STUDY ADDS

Adolescents who see the child and adolescent mental health services at age 15, are more likely to drop out from high school, compared to their peers.

Adolescents who attend youth health clinics could be at risk of high school dropout.

Boys who attend a GP and girls who visit the school health clinic regularly are less likely to become high school dropouts.

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