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EDITORIAL

Here is ruska and kaamos again

When the leaves die there is *ruska*, and when the day dies there is *kaamos*. Autumn and wintertime weigh heavy, and many experience a negative change in mood that is also reflected in behaviour. However, current self-care options are many and easily available to anyone who experiences these seasonal symptoms as a problem.

I list the following self-care options, which are based on scientific findings and will enable each reader to tailor individual programmes. They are ordered in the form of, and embedded in, the acronym LADIES, which we hope will help in recall. So, ladies (and of course gentlemen as well), please have a look and take action. Reading is not enough: these principles need to be put into practice.

L: Light (exposure)
Spend more time outdoors during the day, and try to arrange your environment and schedule, if feasible, to maximize sunlight exposure. Keep curtains open during the day. Move furniture so that you can sit near a window or, if you exercise indoors, set up your equipment by a window. Identify artificial lighting that is designed to produce light bright enough at public places, inside or outdoors, where available. Add and switch on lamps at home. Select, read the instructions and use a bright light therapy lamp or a dawn simulator, if needed, to alleviate symptoms.

A: Activities (contact)
Keep in contact with your family members, relatives, neighbours, working partners, friends and significant others. Plan at least three social activities each month.

D: D vitamin (diet)
Eat with care. Ensure that you take in enough vitamin D from your food. You can get good value for money by eating more fruit and vegetables. Try to avoid sweet foods in particular and heavy meals in general after 6 p.m. to avoid weight gain.

I: Infrared (warm up)
Keep yourself warm during the day. Take a shower or a bath, or go to a sauna or a spa. It is your choice. Put on socks of wool and gloves of cotton to help in falling asleep in the evening.

E: Exercise (body and brain)

Build physical activity into your lifestyle, preferably before symptoms take hold, since physical activity and exercise enhance sleep, increase both physical and mental well-being and support resilience. If possible, make a habit of taking a daily lunchtime walk.

S: Sleep (tight!)

Keep your bedtime as regular as you can. Add three new stress management skills to your arsenal. Learn to perform any routine in the evening that does not activate but quietens your thoughts early enough before your habitual bedtime.

When all else fails, try a winter vacation in sunnier climes if your financial situation and social schedule allow, although keep in mind that symptoms may recur after your return home. Make a list of past symptoms, or a trigger list, and share it with someone. When at home, work at satisfying your hunger for light and resist your craving for carbohydrates. You may also commit to a course of action that you will definitely take, like seeing your doctor, if your state of mood exceeds a limit on three or more days in a week.

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Editor-in-Chief, *Psychiatria Fennica*

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The last few decades have witnessed a growing interest in the field of mental health and the speciality of Psychiatry has expanded at a great pace with high projections for mental health morbidity (1). The need for more emphasis on mental well-being is equally highlighted by current epidemiological literature that indicates an increasing number of mental health problems all over the globe (2). Mental disorders are no doubt highly prevalent and are causing considerable suffering and disease burden all over the world. To compound this health problem, many individuals with psychiatric disorders remain undiagnosed and untreated although effective treatments exist. The public health impact of mental disorders is profound as the estimated disability-adjusted life years attributable to mental disorders have been shown to be very high (3).

Despite the growing evidence about the impact of mental illnesses, mental health care continues to show big gaps. While areas like policies and practices are important, the issue of lack of manpower and capacity building makes the situation even worse. Globally, fewer mental health professionals, scarcity of mental health resources and the now often additional problems of migration of trained psychiatrists and mental health professionals to already resource rich countries makes the situation even worse (4).

The issue of manpower development and capacity building in mental health care unfortunately remains a forgotten area, and as per WHO's description the number of mental health professionals is far below the desired strengths. It is a pity that despite the importance of this focus the worldwide data still show that the median distribution of psychiatrists per 100 000 population in the world is 1.2, with a variance of 0.04/100 000 population in Africa to 9.8/100 000 population in Europe. Resources are especially scarce in low- and middle-income countries and wherever resources are available, these are distributed unequally. A similar picture emerges with other mental health professionals including nurses, social workers, psychologists and community mental health workers (5).

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It is true that there is a prevailing enthusiasm and optimism in the field of mental health, but finding the most appropriate way of integrating the wealth of new scientific knowledge and information, especially in the teaching and training curriculum in psychiatry, continues as a major challenge (6). Concomitant with this new growth and educational tasks, special difficulties of resources add further limitations in this area. Some programmes, mainly found in developed countries, can easily afford to deal with the challenges of faculty resources, availability of educational equipment and tools, access to computers and libraries and affordability of the required length of training. However, the situation in low resource countries makes it difficult to have even the basic curriculum modifications, adaptations and expansion of teaching programmes to meet the evolving changes in acquiring new knowledge (7).

Psychiatry remains much less than desirable in the list of choices for future careers in many countries (8). There is no doubt that medical students' educational experience of psychiatry plays a great role in determining whether they choose a future career in psychiatry, however, stigmatic attitudes about this speciality among the medical profession lessen the importance of this branch of medicine and makes it unattractive for many aspiring medical students. Students also develop misconceptions about mentally ill patients. Some feel that psychiatry is unscientific, lacks evidence and treatment is not effective for most of the illnesses. Similarly, the notion that the mentally ill are generally unpredictable and can be dangerous to others makes this field even more unpopular (8,9).

It is a fact that the large majority of medical students will not become psychiatrists; for them a psychiatry clinical placement will be the only experience of psychiatric practice before they begin to work as doctors (10). The fact is that the traditional teaching methods used in psychiatry are directed more towards imparting knowledge than changing the attitudes of students. The training experience in many places does not address the management of common mental disorders, suicide, self-harm, violence, substance misuse, psychopharmacology, nor the treatment of those patients who have comorbid medical and psychiatric illnesses (11,12). More recently, there has also been an emphasis on well-being and population health, and how to ensure that positive emotional states are protected and nurtured in the workplace and in family life (13).

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There is thus a strong need for supporting a well-acknowledged place for psychiatry in the undergraduate medical teaching programmes (14). The undergraduate curriculum needs to be modified so that students acquire attitudes like empathy: learning to respect patients and understanding their feelings along with developing therapeutic relations (15).

Newer teaching and assessment techniques need to be used to bring about attitudinal changes and develop interest among medical students (16). Case-based and problem-based learning, small group teaching, simulated patients, using movies, multidisciplinary seminars, integrated teaching, attitude questionnaires, objective structured clinical examinations etc., should be introduced into the curriculum to achieve this objective. The tasks should prioritize imparting knowledge and stimulating interest, as well as removing any stigma surrounding psychiatry and psychiatrists. This would also help toward increasing recruitment to psychiatry (17).

As people are living longer there is an increased level of comorbidity of mental and physical disorders. Furthermore, rates of some psychiatric illnesses are rising and presentation of illnesses is changing too. In addition, although there is still a lot of stigma around, more people are becoming aware of mental illness. Therefore, the role of psychiatrists is highly important in reducing the burden of mental disorders. This is particularly relevant as psychiatrists play different roles ranging from being physicians, clinicians and mental health experts to teachers, researchers, public mental health specialists and advocates for people with mental illness. This obviously makes a good case for having a well-resourced workforce in psychiatry (18). Therefore not only do we need to ensure that across undergraduate curricula psychiatry is taught and assessed appropriately, but also to make increased efforts to encourage and improve the number of students choosing psychiatry as their future career.

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Risk factors related to self-harming behaviour in Finnish adolescent inpatients with a history of non-suicidal self-injury, suicidal behaviour or both

Minna Rytilä-Manninen, Henna Haravuori, Kirsi Kettunen, Sari Fröjd, Mauri Marttunen, Nina Lindberg

Abstract

Theoretically, non-suicidal self-injury and suicide attempt are regarded as behaviours on a single continuum of self-injury. The aim of the present study was to shed more light on clinical differences between adolescent inpatients with non-suicidal self-injury (NSSI), those with suicidal behaviour (SB) and those with both SB and NSSI. We studied risk factors related to self-harming behaviour in an inpatient sample (N=205) consisting of 13- to 17-year-old adolescents referred to psychiatric hospital for the first time in their lives between 2006 and 2010. Of them, 86 (42.0%) reported no history of self-harm, 62 (30.2%) showed a history of SB but no history of NSSI, 10 (4.9 %) had a history of NSSI and 47 (22.9%) had a history of both SB and NSSI. Depressive disorders and bipolar disorders, self-reported psychiatric symptoms (measured by SCL-90) and symptoms of depression were associated with SB. Social dysfunction was related to NSSI. Sexual abuse, impulsivity and symptoms of depression were related to SB with NSSI. Self-reported psychoticism was associated with all three self-harming groups. As could be expected, more severe self-harming behaviour (SB) was closely related with psychiatric diagnosis, while the risk factors for NSSI were related to difficulties in peer relationships.

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Introduction

Rates of non-suicidal self-injury (NSSI) and suicidal behaviour increase from childhood to adolescence and peak in prevalence among 15- to 19-year olds (1). Both NSSI and suicide attempt are regarded as behaviours on a single continuum of self-injury (1). The most common function of NSSI in adolescents is to escape from either adverse emotions (e.g. sadness and anxiety) or cognitive (e.g. negative memories or thoughts) states (2). NSSI has been regarded as a strategy of emotional adaptation and regulation (1), but if this strategy fails, the adolescent may undertake more severe forms of self-injury, which become progressively closer to suicidal behaviour (SB) (1).

By definition, both NSSI and SB involve intentional harm of oneself, but, unlike adolescents with SB, those with NSSI do not show an intention to die (3). The increasing rate of NSSI is of particular concern since individuals with a history of NSSI are at increased risk of suicide (4). According to the interpersonal theory of suicide, NSSI builds up suicide capability by habituating the self-injurer to the pain and fear involved in a suicide attempt (5).

Adolescents with NSSI and SB share many common risk factors including childhood trauma and abuse (6-8), negative peer interaction (9), family conflict (8), isolation, loneliness, impulsivity, history of borderline personality disorder, (4), high level of physiological reactivity in response to stress, reduced ability to tolerate stress and deficits in social problem solving ability (8,10-11). On the other hand, adolescents with NSSI and those with SB also show a clinically important difference: adolescents with NSSI show a more positive attitude toward life than those with SB (4,12).

Previous research, studying factors that differentiate between adolescents who show NSSI only, adolescents with SB only and adolescents with both SB and NSSI, has found that adolescents with both SB and NSSI show a higher prevalence of psychiatric disorders, particularly major depressive disorder and post-traumatic stress disorder (PTSD), than adolescents in other self-harming groups (2). Adolescents with both SB and NSSI exhibit greater psychiatric symptom severity (e.g. depressive symptoms) and higher traits of impulsivity than adolescents with NSSI only or adolescents with SB only (2). Further, adolescents with a history of both SB and NSSI show higher levels

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of self-directed aggressiveness during inpatient treatment than the other groups. They have also experienced more frequently sexual abuse, hospitalizations and residential treatment placements than adolescents with NSSI only or adolescents with SB only. According to Boxer and colleagues (7), adolescents with NSSI only and those with both SB and NSSI spent significantly more time in psychiatric treatment compared to adolescents with SB only.

The aim of the present study was to study differences between adolescent inpatients with NSSI only, those with SB only and those with both SB and NSSI. Our special interest was on risk factors related to self-harming behaviour.

Based on extant literature, we analysed differences in psychiatric disorders, psychiatric symptoms, impulsivity, alcohol use, adverse childhood experiences, family factors and social functioning between the above mentioned patient groups.

Method

Participants and procedure

The Kellokoski Hospital Adolescent Inpatient Follow-Up Study (KAIFUS) is a longitudinal naturalistic study of the clinical characteristics in a consecutive sample of adolescent psychiatric inpatients in Finland. This inpatient sample consists of 13- to 17-year-old adolescents referred to psychiatric hospital for the first time in their lives between 2006 and 2010 (N=395). Non-eligible patients were those who had a treatment period of less than two weeks, those who showed intellectual disability, those under 13 years of age and those with poor knowledge of the Finnish language (N=80, 20.2%). Of the 315 eligible patients, 62 (19.7%) declined to participate, or their parents or legal guardians did not provide their permission to participate. In 23 (7.3%) cases, patients or their parents discontinued the treatment period, and 24 (7.6%) cases had incomplete data. Thus, the sample comprised 206 inpatients. Non-participation was unrelated to age (p=0.31), living situation (p=0.58), substance use (p=0.59), mood (p=0.92), anxiety (p=0.39), eating (p=0.34) or conduct disorders (p=0.09) as principal diagnoses, but it was associated with male gender (p=0.02) and a diagnosis of psychotic disorder (p=0.02). When we analysed the variables related to self-harm, data of one girl turned out to be missing. So, the final sample of this study comprised 205 adolescents (60 boys) with a mean age of 15.1 years (SD=1.2). For more details, see Minna Rytilä-Manninen and colleagues (13).

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Measurements

The Schedule for Affective Disorders and Schizophrenia for School-Age Children-Present and Lifetime Version (K-SADS-PL) (14) was performed to assess psychiatric diagnoses.

Self-harm was measured using questions included in the K-SADS-PL interview. The information on suicidal behaviour was based on the following two questions concerning the suicidal ideation and suicide method: "Have you thought about death?" and "Have you had suicide plans?" ("none"=not present; "sub-threshold"=thought about death but not specific method; and "threshold"=have often thought about death and have also thought the suicide method) and the seriousness of suicidal intent: "Have you actually tried to kill yourself?" ("none"=no attempt or gesture with any intent to die; "sub-threshold"=present, but very ambivalent; and "threshold"=definite suicidal intent). The person with SB was regarded as a person who fulfilled the threshold criteria for serious suicidal ideation (often thinks of suicide and has thought of a specific method, and/or fulfilled the sub-threshold or threshold criteria for one or more suicidal acts (with ambivalent or definite suicidal intent). The information on non-significant self-injury was based on the question about non-suicidal physical self-damaging acts without any intent to die ("none"=not present; "sub-threshold"=infrequent (one to three times a year) but has never caused serious injury; and "threshold"=frequent (four or more times a year) or has caused serious self-injury (for example burned skin or broken bones). A person was defined as having engaged in non-significant self-injury if a non-suicidal physical self-damaging act fulfilled the threshold level. A person with no history of SB or NSSI was regarded as a person with no self-harming behaviour. And finally, a person could have both types (SB and NSSI) of self-harming behaviour.

Data on adverse childhood experiences (ACE) were gathered using a structured background data collection sheet, the K-SADS-PL interview screening section for PTSD, and the Life Events Checklist (LEC) (15). Adolescents were asked if their parents had divorced (no/yes), and if their mother or father had suffered from psychiatric or substance use problems requiring professional help (no/yes). Parents' criminality was assessed using the LEC question: "Have your parents ever been arrested or suspected or judged for a criminal offence?" (no/yes). The information about witnessing intimate partner violence (no/yes) and exposure to physical (no/yes) or sexual abuse (no/yes) was based on the K-SADS-PL interview.

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The accumulation of different ACE categories was described by creating an ACE total score, ranging from zero (the person had not been exposed to any studied ACE categories) to seven (the person had been exposed to all studied ACE categories). In this study, the mean ACE total score was 2.2 (SD 1.6). For details, see Rytilä-Manninen and colleagues (13).

Psychiatric symptoms were measured using the Symptom Checklist-90 (SCL-90) (16), which is a self-report measure for people aged 13 or older. It consists of 90 items, which measure subjective symptoms on nine primary symptom dimensions. Items are rated on a five-point Likert scale of distress, ranging from "not at all" (0) to "extremely" (4). Thus, the sum score can range from zero to 360. The reference period for the symptoms is the last two weeks. The psychometric properties of SCL-90 have been shown to be good for adolescents (17). In this study, Cronbach's alphas ranged from 0.800 (paranoid ideation) to 0.943 (depressive disorders). For further analyses, the SCL-90 sum score was used.

Impulsivity, family dysfunction and social dysfunction were measured with the Offer Self-Image Questionnaire (OSIQ-R) (18), which is a 129-item personality test for adolescents between the ages of 13 and 18. Items are rated on a six-point Likert scale, ranging from "describes me very well" (1) to "does not describe me at all" (6). OSIQ-R comprises twelve component scales, but, in this study, only those described below were used. *Impulse control* is a nine-item scale to measure whether the adolescent can handle pressure. The scale score can range from 9 to 54. Higher scores suggest that a teenager has low frustration tolerance and often acts on impulse. In this study, the Cronbach's alpha for this scale was 0.659. *Social functioning* is also a nine-item scale used to assess patterns of interpersonal relationships and friendships. The scale score can range from 9 to 54. Higher scores indicate that a teenager is unable to have and maintain close relationships with individuals of his or her own age and feels uncomfortable when socializing with peers. In this study, the Cronbach's alpha for this scale was 0.819. *Family functioning* is a 19-item scale focusing on the adolescent's feelings about, and relationships with his or her parents, as well as emotional atmosphere at home. The scale score can range from 19 to 114. Higher scores indicate that the adolescent feels that there is tension at home, that the relationships are problematic and that he/she is not getting support from his/her parents. In this study, the Cronbach's alpha for this scale was 0.842. The OSIQ has been widely used and validated for Finnish adolescents (19-22).

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Alcohol use was self-assessed with the Alcohol Use Disorders Identification Test (AUDIT) (23), which includes 10 items scored from 0 to 4. Thus, the AUDIT sum score can range from zero to 40. Self-assessment has shown good psychometric properties (24). In this study, the Cronbach's alpha was 0.914.

Ethics

Participation was voluntary. All participants and their legal guardians gave their written informed consent. Permission to conduct the study was granted by the authorities of the Helsinki and Uusimaa Hospital District. The Ethics Committee of Helsinki University Hospital approved the study protocol.

Data analysis

The distributions of variables are presented as percentages for categorical variables and means (M) and standard deviations (SD) for continuous variables. The chi-square (χ^2) test, Fisher's exact test and columns proportions were compared with z-test with Bonferroni correction (post hoc analysis), analysis of variance (ANOVA) with Tukey's post hoc comparison test, and multinomial logistic regression models were used to compare the groups. P-values <0.05 were considered statistically significant. Analyses were performed using SPSS 22.0 for Windows.

Results

Bivariate analyses

Of 205 adolescent inpatients, 86 (42.0%) reported no history of self-harm, 62 (30.2%) showed a history of SB but no history of NSSI, 10 (4.9 %) had a history of NSSI and 47 (22.9%) had a history of both SB and NSSI. Gender and diagnostic distributions in these four groups are presented in Table 1. Fisher's exact test revealed significant differences between the self-harming groups on depressive disorder (p=0.025) and bipolar disorder (p=0.028), but other diagnoses showed no significant group differences. When the different forms of self-harming behaviour were tested against each other in the post hoc analyses, no significant differences were found. Female gender seemed to be over-represented in all three self-harming groups and this gender difference was significant (p<0.001).

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Table 1. Distribution of gender and psychiatric diagnoses in different self-harming groups.					
	Adolescents with no self-harming behaviour (n=86)	Adolescents with SB but without NSSI (n=62)	Adolescents with NSSI but without SB (n=10)	Adolescents with both SB and NSSI (n=47)	Total (N=205)	p
Gender; n (%)						
Female	45 (52.3)	50 (80.6)	9 (90.0)	41 (87.2)	145 (70.7)	<0.001
K-SADS-PL Diagnosis; n (%)						
Depressive disorder	44 (51.2)	45 (72.6)	4 (40.0)	31 (66.0)	124 (60.5)	0.025[a]
Bipolar disorder	2 (2.3)	9 (14.5)	1 (10.0)	3 (6.4)	15 (7.3)	0.028[b]
Anxiety disorder	27 (31.4)	21 (33.9)	6 (60.0)	22 (46.8)	76 (37.1)	0.131
Alcohol use disorder	10 (11.6)	5 (8.1)	1 (10.0)	3 (6.4)	19 (9.3)	0.760
Conduct disorder	25 (29.1)	15 (24.2)	0 (0.0)	11 (23.4)	51 (24.9)	0.239
Psychotic disorder	11 (12.8)	4 (6.5)	2 (20.0)	5 (10.6)	22 (10.7)	0.394
Eating disorder	14 (16.3)	10 (16.1)	2 (20.0)	6 (12.8)	32 (15.6)	0.885
PTSD or adjustment disorder	8 (9.3)	5 (8.1)	1 (10.0)	9 (19.1)	23 (11.2)	0.288
ADHD	11 (12.8)	6 (9.7)	0 (0.0)	3 (6.4)	20 (9.8)	0.613

SB=suicidal behaviour, NSSI=non-suicidal self-injury
[a] column proportions do not significantly differ from each other in the post hoc analysis
[b] column proportion of no self-harming behaviour differs significantly from SB without NSSI in post hoc analysis but the self-harming behaviours do not differ from each other

The distribution of various ACE is presented in Table 2. According to Fisher's exact test, significant group differences were found on parental criminality (p=0.045) and sexual abuse (p<0.001). Again, the different forms of self-harming behaviour did not differ from each other in the post hoc analyses. Other ACE showed no significant group differences.

To determine group differences in the continuous outcome variables, including psychiatric symptoms, alcohol use, impulsivity, family dysfunction, social dysfunction and ACE total score, ANOVA was conducted. Analysis indicated an overall effect for group membership (adolescents with no self-harming behaviour, adolescents with SB only, adolescents with NSSI only, adolescents with both SB and NSSI) on psychiatric symptom scores, impulsivity scores, family dysfunction scores and social dysfunction scores (Table 3). Tukey's post hoc comparison test showed that the participants with no self-harming behaviour had significantly lower psychiatric symptom scores and social dysfunction scores than the three groups with self-harming behaviour. The group with no self-harming behaviour scored significantly lower on both impulsivity and family dysfunction scores than the SB group and the SB and NSSI group.

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Next, the group differences in the SCL-90 sub-scales (Somatization, Interpersonal sensitivity, Depression, Anxiety, Phobic anxiety, Paranoid ideation, Psychoticism, Obsessive-compulsivity and Hostility) were investigated (Table 4). ANOVA indicated an overall effect for group membership (adolescents with no self-harming behaviour, adolescents with SB only, adolescents with NSSI only, adolescents with both NSSI and SB) on all sub-scale scores. Tukey's post hoc comparison test revealed that the group with no self-harming behaviour showed significantly lower scores on sub-scales Somatization, Depression, Anxiety, Phobic anxiety, Psychoticism, Obsessive compulsivity and Hostility than the three groups with self-harming behaviour. The group with no self-harming behaviour exhibited significantly lower scores on both Interpersonal sensitivity and Paranoid ideation sub-scales than the SB group and the SB and NSSI group.

Table 2. Distribution of adverse childhood experiences in different self-harming groups.						
	Adolescents with no self-harming behaviour (n=86)	Adolescents with SB but without NSSI (n=62)	Adolescents with NSSI but without SB (n=10)	Adolescents with both SB and NSSI (n=47)	Total (N=205)	p
Parental divorce	51 (59.3)	30 (48.4)	7 (70.0)	24 (51.1)	112 (54.6)	0.513
Parental psychiatric problems	33 (38.4)	27 (43.5)	5 (50.0)	16 (34.0)	81 (39.5)	0.674
Parental alcohol problems	29 (33.7)	21 (33.9)	3 (30.0)	16 (34.0)	69 (33.7)	1.000
Parental criminality	3 (3.5)	2 (3.2)	1 (10.0)	7 (14.9)	13 (6.3)	**0.045**[a]
Witnessing intimate partner violence	28 (32.6)	18 (29.0)	3 (30.0)	15 (31.9)	64 (31.2)	0.979
Physical abuse	18 (20.9)	15 (24.2)	1 (2.1)	13 (27.7)	47 (22.9)	0.678
Sexual abuse	6 (7.0)	15 (24.2)	2 (20.0)	21 (44.7)	44 (21.5)	**< 0.001**[b]

SB=suicidal behaviour, NSSI=non-suicidal self-injury

[a] column proportions do not significantly differ from each other in the post hoc analysis

[b] column proportion of no self-harming behaviour differs significantly from SB without NSSI, and from SB with NSSI in post hoc analysis but the self-harming behaviours do not differ from each other

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Table 3. Descriptive statistics for analysed continuous variables across different self-harming groups.

	Adolescents with no self-harming behaviour (n=86)	Adolescents with SB but without NSSI (n=62)	Adolescents with NSSI but without SB (n=10)	Adolescents with both SB and NSSI (n=47)	F	df	p
Psychiatric symptoms; mean (SD)	79.0 (62.3)	132.9 (69.4)	162.8 (60.9)	148.9 (60.1)	16.26	3, 192	< 0.001[a]
Alcohol use	3.0 (5.8)	4.4 (6.7)	2.7 (5.8)	5.8 (7.8)	1.98	3, 187	NS
Impulsivity	27.9 (7.11)	32.5 (6.3)	34.7 (6.8)	35.3 (6.5)	12.25	3, 179	< 0.001[b]
Family dysfunction	49.4 (14.9)	59.7 (17.1)	57.2 (5.0)	61.7 (14.8)	7.24	3, 170	< 0.001[c]
Social dysfunction	23.9 (8.1)	29.8 (7.5)	34.1 (5.1)	30.6 (7.5)	7.24	3, 170	< 0.001[d]
ACE total score	2.1 (1.6)	2.2 (1.6)	2.5 (1.2)	2.6 (1.8)	1.38	3, 201	NS

Comparisons made using ANOVA with Tukey's post hoc test.

SB=suicidal behaviour, NSSI=non-suicidal self-injury, NS=not statistically significant

[a] The psychiatric symptoms sum score of adolescents with no self-harming behaviour was significantly lower than those of all three self-harming groups

[b] The impulsivity sum score of adolescents with no self-harming behaviour was significantly lower than that of adolescents with SB and that of adolescents with both SB and NSSI, but no statistically significant difference was observed between adolescents with no self-harming behaviour and those with NSSI

[c] The family dysfunction sum score of adolescents with no self-harming behaviour was significantly lower than that of adolescents with SB and that of adolescents with both SB and NSSI, but no statistically significant difference was observed between adolescents with no self-harming behaviour and those with NSSI

[d] The social dysfunction sum score of adolescents with no self-harming behaviour was significantly lower than those of all three self-harming groups

Table 4. The Symptom Checklist-90 sub-scales in different self-harming groups.

	Adolescents with no self-harming behaviour (n=86)	Adolescents with SB but without NSSI (n=62)	Adolescents with NSSI but without SB (n=10)	Adolescents with both SB and NSSI (n=47)	F	df	p
Somatization	8.6 (8.1)	12.5 (8.7)	17.4 (7.7)	14.3 (8.0)	7.34	3, 201	< 0.001[a]
Interpersonal sensitivity	9.1 (8.1)	14.7 (8.2)	15.9 (8.7)	16.0 (7.3)	10.12	3, 196	< 0.001[b]
Depression	15.2 (12.1)	27.8 (14.1)	29.1 (8.9)	30.4 (10.6)	20.39	3, 196	< 0.001[a]
Anxiety	8.3 (7.9)	14.8 (9.0)	19.9 (7.7)	16.2 (8.0)	14.27	3, 196	< 0.001[a]
Phobic anxiety	4.7 (5.4)	8.5 (7.3)	11.9 (7.4)	8.2 (6.3)	7.35	3, 196	0.001[a]
Paranoid ideation	5.3 (4.6)	8.5 (5.9)	8.2 (4.9)	8.9 (5.3)	6.76	3, 196	< 0.001[b]
Psychoticism	5.1 (5.4)	10.5 (8.6)	16.1 (8.7)	12.7 (6.7)	17.33	3, 196	< 0.001[a]
Obsessive-compulsivity	10.8 (8.7)	16.2 (9.1)	21.6 (7.4)	18.9 (8.9)	11.56	3, 196	< 0.001[a]
Hostility	5.1 (4.7)	7.3 (5.3)	9.6 (5.2)	9.3 (4.9)	8.65	3, 196	< 0.001[a]

SB=suicidal behaviour, NSSI=non-suicidal self-injury

[a] The sub-scale score of adolescents with no self-harming behaviour was significantly lower than those of all three self-harming groups

[b] The sub-scale score of adolescents with no self-harming behaviour was significantly lower than that of adolescents with SB and that of adolescents with both SB and NSSI, but it did not significantly differ from that of adolescents with NSSI

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Multinomial analyses

In order to assess potential mutual risk factors for self-harming behaviour, multinomial regression analysis was performed. The group with no self-harm served as a reference group for all three self-harming groups. Age and gender were used as covariates in the analyses. First, all psychiatric diagnoses (see Table 1) were entered into the model. Depressive (OR 4.05, CI 1.65-9.94, p=0.002) and bipolar disorders (OR 15.22, CI 2.72-83.89, p=0.002) were significantly related to SB. Anxiety disorder was linked to SB with NSSI, but the finding did not quite reach statistical significance (OR 2.17, CI .995-4.71, p=0.051). None of the studied diagnoses were significantly related to NSSI only.

In the second phase, all adversities (parents' divorce, parental mental health problems, parental alcohol use problems, parental criminality, witnessing intimate partner violence, physical abuse and sexual abuse) were entered into the model. Only one statistically significant result was found: sexual abuse was significantly related to SB with NSSI (OR 7.48, CI 2.53-22.09, p<0.001). Multinomial regression analysis revealed that the ACE total score was related to SB with NSSI, but the finding did not reach statistical significance (OR 1.25, CI 1.00-1.56, p=0.050).

In the third phase, impulsivity, social dysfunction, family dysfunction, alcohol use and psychiatric symptoms were entered into the model (Table 5). Impulsivity was significantly related to SB with NSSI (OR 1.08, CI 1.00-1.16, p=0.044), and psychiatric symptoms were significantly related to SB (OR 1.01, CI 1.00-1.02, p=0.023) and to SB with NSSI (OR 1.01, CI 1.00-1.02, p=0.035). Entering the ACE total score to the model revealed some substantial changes: psychiatric symptoms no longer associated significantly with SB, but social dysfunction was significantly related to NSSI (OR 1.19, CI 1.00-1.41, p=0.048).

In the fourth phase, in order to assess psychiatric symptomatology more closely, we entered all SCL-90 sub-scales into the multinomial regression model (Table 6). The sub-scale Psychoticism was significantly associated with all three self-harming groups, with the strongest association with NSSI (OR 1.45, CI 1.17-1.81, p=0.001), followed by SB with NSSI (OR 1.19, CI 1.05-1.35, p=0.006). The sub-scale Depression was significantly related to SB (OR 1.10, CI 1.03-1.18, p=0.006) and to SB with NSSI (OR 1.10, CI 1.02-1.19, p=0.011). When the ACE total score was entered to the model, the significances did not change.

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Table 5. Multinomial regression analyses of associations between different groups of self-harming behaviour and impulsivity, social dysfunction, family dysfunction, alcohol use and psychiatric symptoms.

Group	Variable	OR	CI 95%	p
Step 1				
SB	Impulsivity	1.02	0.950-1.092	0.610
	Social dysfunction	1.04	0.977-1.110	0.215
	Family dysfunction	1.02	0.989-1-048	0.230
	Alcohol use	1.02	0.955-1.099	0.504
	Psychiatric symptoms	1.01	1.001-1.017	**0.023**
NSSI	Impulsivity	1.06	0.908-1.240	0.453
	Social dysfunction	1.17	0.997-1.373	0.054
	Family dysfunction	0.99	0.919-1.056	0.678
	Alcohol use	1.02	0.875-1.188	0.807
	Psychiatric symptoms	1.01	0.991-1.022	0.435
SB+NSSI	Impulsivity	1.08	1.002-1.164	**0.044**
	Social dysfunction	1.04	0.966-1.114	0.314
	Family dysfunction	1.02	0.985-1.051	0.291
	Alcohol use	1.04	0.965-1.117	0.320
	Psychiatric symptoms	1.01	1.001-1.018	**0.035**
Step 2				
SB	Impulsivity	1.01	0.942-1.087	0.745
	Social dysfunction	1.04	0.975-1.111	0.231
	Family dysfunction	1.01	0.982-1.044	0.430
	Alcohol use	1.01	0.936-1.085	0.837
	Psychiatric symptoms	1.01	1.001-1.016	**0.035**
	ACE total score	1.04	0.817-1.412	0.767
NSSI	Impulsivity	1.05	0.895-1.229	0.557
	Social dysfunction	1.19	1.001-1.406	**0.048**
	Family dysfunction	0.97	0.904-1.041	0.403
	Alcohol use	1.00	0.856-1.172	0.986
	Psychiatric symptoms	1.00	0.988-1.020	0.627
	ACE total score	1.35	0.686-2.661	0.385
SB+NSSI	Impulsivity	1.10	1.000-1.168	**0.049**
	Social dysfunction	1.06	0.980-1.141	0.151
	Family dysfunction	1.01	0.972-1.042	0.712
	Alcohol use	1.03	0.995-1.110	0.443
	Psychiatric symptoms	1.01	0.999-1.017	0.071
	ACE total score	1.29	0.958-1.748	0.093

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Table 6. Multinomial regression analyses of associations between different groups of self-harming behaviour and the Symptom Checklist-90 sub-scales.

Category	Variable	OR	CI 95%	p
SB	Somatization	0.95	0.879-1.026	0.191
	Interpersonal sensitivity	0.92	0.827-1.017	0.102
	Depression	1.10	1.028-1.182	**0.006**
	Anxiety	1.04	0.926-1.174	0.490
	Phobic anxiety	0.99	0.897-1.100	0.900
	Paranoid ideation	0.99	0.872-1.132	0.922
	Psychoticism	1.15	1.023-1.292	**0.019**
	Obsessive-Compulsivity	0.94	0.882-1.054	0.425
	Hostility	0.93	0.828-1.049	0.244
NSSI	Somatization	0.94	0.813-1.082	0.381
	Interpersonal sensitivity	0.88	0.706-1.092	0.243
	Depression	0.94	0.801-1.099	0.428
	Anxiety	1.16	0.931-1.452	0.184
	Phobic anxiety	1.07	0.868-1.320	0.526
	Paranoid ideation	0.72	0.543-0.957	0.023
	Psychoticism	1.45	1.173-1.812	**0.001**
	Obsessive-Compulsivity	1.12	0.935-1.344	0.219
	Hostility	0.87	0.694-1.086	0.216
SB+NSSI	Somatization	0.95	0.871-1.033	0.228
	Interpersonal sensitivity	0.93	0.828-1.038	0.187
	Depression	1.10	1.022-1.188	**0.011**
	Anxiety	1.02	0.893-1.154	0.818
	Phobic anxiety	0.95	0.844-1.058	0.323
	Paranoid ideation	0.93	0.807-1.072	0.320
	Psychoticism	1.19	1.051-1.345	**0.006**
	Obsessive-Compulsivity	1.02	0.926-1.118	0.723
	Hostility	1.01	0.892-1.133	0.931

SB=adolescents with suicidal behaviour, but without non-suicidal selfinjury;
NSSI=adolescents with non-suicidal self-injury, but without suicidal behaviour;
SB + NSSI=adolescents with both suicidal behaviour and nonsuicidal self-injury

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Discussion

The aim of the present study was to study differences between adolescent inpatients with different kinds of self-harming behaviour. As compared to previous inpatient studies with approximately 30% of adolescents being engaged in NSSI (7,25), the prevalence of our adolescents with NSSI only, turned out to be remarkably low (4.9%). This is most probably explained by the Finnish treatment culture, where patients with NSSI are mainly treated in outpatient clinics. In accordance with previous studies (7,25) approximately 30% of our inpatients showed a history of SB but no NSSI. The prevalence of adolescents with a history of both SB and NSSI was approximately 23%. In earlier studies, the prevalence of these inpatients has ranged from 18.9% (26) to 30.9% (7), and even up to over 70% (25,27). Despite these somewhat inconsistent findings, it looks clear that NSSI and SB often co-occur. Indeed, studies have demonstrated that NSSI is a strong risk factor for later suicidality (26,28-29) even after adjusted for other risk factors (1,30) and thus, NSSI could be regarded as a gateway toward more severe forms of self-harming behaviour. These findings indicate that NSSI should always be taken seriously in clinical settings in order to prevent later suicidality.

Both depressive and bipolar disorders were significantly associated with SB, but we were unable to find any other substantial relations between different diagnoses and self-harming groups. Our finding related to depressive disorders is in accordance with some earlier studies, which have reported that suicidal adolescents are more likely to have a diagnosis of depression compared to their counterparts with NSSI (31-32). Different from our finding, Hamza and colleagues (30) have reported that adolescents with both SB and NSSI are more likely have a diagnosis of major depressive disorder and post-traumatic stress disorder (PTSD) than adolescents with NSSI only (32). Further, NSSI, SB, as well as SB together with NSSI have all been associated with borderline personality disorder in adolescence (32). Unfortunately, we were unable to study this kind of relation, since, during the study period, personality disorder diagnoses were not made in the index study wards. Nowadays, borderline personality disorder diagnosis is made according to national Treatment Guideline.

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Focusing on ACE, adolescents with self-harming behaviour did not significantly differ from those with no self-harming behaviour with regard to parents' divorce, parental mental health or alcohol problems, witnessing intimate partner violence or physical abuse. In univariate analyses both sexual abuse and parents' criminality showed significant group differences. In multivariate analyses, however, only sexual abuse was significantly associated with SB with comorbid NSSI. This finding has been verified in numerous previous studies which all have reported that adolescents with both suicidality and NSSI commonly have experienced sexual and other abuse as well as childhood maltreatment (2,7,33-35). The relationship between abuse and maltreatment and later suicidality with NSSI appears to be explained by two factors (7). First, childhood abuse is a significant risk factor for future psychopathology, especially for internalizing problems (13,36-37). Secondly, being a victim of abuse and/or maltreatment habituates a person to pain, as well as to the anticipatory anxiety associated with pain.

In our sample, impulsivity was associated with SB with comorbid NSSI, but not with NSSI only. The finding is in accordance with a previous study by Dougherty and colleagues (38), which showed that adolescents with both SB and NSSI exhibit higher levels of impulsivity than their counterparts with NSSI only. It is known that adolescents with self-harming behaviour are more likely to report being bullied by their peers than their counterparts with no self-harming behaviour (39). It has also been reported that, among suicidal adolescents, loneliness increased the risk of self-mutilation to almost 6-fold (40). In the present study, subjective social dysfunction was associated with NSSI only. The finding is interesting, since it has previously been reported that adolescents with NSSI only tend to show less psychosocial dysfunction compared to SB and NSSI and those with SB only (1).

Self-reported depressive symptoms were associated with both SB and SB with comorbid NSSI, and the finding is in line with several previous studies (1,41). Our finding that self-reported psychoticism was associated with all self-harming groups is less often discussed in earlier studies. Stewart and colleagues (2) reported higher rates of psychotic symptoms among adolescents with no current suicide ideation and no lifetime suicide attempts, and among those with current ideation and at least one lifetime attempt, compared to adolescents with current ideation and no lifetime attempts. On the other hand, in a community sample by Honings and colleagues (42), psychotic symptoms were regarded as a risk factor of both suicide ideation and suicide attempt. The explanation for our finding might be that all self-harming groups associate with depressive symptoms (43) and dissociative experiences (44), usually due to ACE and/or a borderline personality disorder (43). These depressive and dissociative symptoms, in turn, link to symptoms of psychoticism (45-46).

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Strengths and limitations

One of the strengths of this study was its relatively high number of consecutive inpatients. However, of the eligible inpatients, as many as 109 (34.6%) dropped out from the study. Dropping out was related to male gender and psychotic disorder. Boys are known to suffer from externalizing disorders more often than girls, which may have somewhat skewed our results. We used the highly reliable and valid semi-structured K-SADS-PL interviews to set the DSM-IV-based psychiatric diagnoses. Unfortunately, the inter-rater reliabilities of the diagnoses derived from the K-SADS-PL was not measured. A structured background data collection sheet enabled us to consistently collect background information on all inpatients. However, data was partly collected retrospectively, which may have introduced a recall bias. The study method did not allow us to separate intra- and extrafamilial sexual abuse. In the hospital area, where the study took place, adolescent patients with neuropsychiatric, substance use and serious eating disorders are referred to special tertiary units rather than to local adolescent psychiatric wards. Further, in Finland, most adolescents with severe conduct disorders receive treatment under child welfare services, not under the specialty of adolescent psychiatry.

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Risk factors related to self-harming
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with a history of non-suicidal self-injury,
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Individual characteristics and the use of emergency room services among adolescents and young adults

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Abstract

Predictors of emergency room (ER) service utilization and the visit rate among young people in 2005-2010 were investigated using a panel data model.

Students (N=416) completed a questionnaire concerning their health and psychosocial characteristics at ages 13-18 and 19-24 years. Data regarding the utilization of ER services were gathered from the medical records of the local public primary healthcare services. Multivariable logistic regression models were used to compute incidence rate ratios, odds ratios and the unsystematic variance component Rho (ρ), for ER utilization.

Male gender was associated with a lower ER visit rate (OR 0.5, 95% CI 0.3-0.7, p<0.001). Good school performance among males at baseline was associated with decreased ER use (native language OR 0.1, 95% CI 0.0-0.6, p=0.01; general subjects OR 0.2, 95% CI 0.0-0.6, p=0.009). Alcohol consumption among females at baseline (OR 2.1, 95% CI 1.0-4.4, p=0.047), and not studying or working among females on follow-up (OR 2.2, 95% CI 1.1-4.3, p=0.02) associated with ER service utilization. Abuse in childhood (OR 2.7, 95% CI 1.5-4.8, p=0.001) and mental health problems among males (OR 5.9, 95% CI 1.6-22.0, p=0.008) associated with an increased ER service visit rate. The contribution of unmeasured factors, or the individual style, was estimated as unobserved heterogeneity Rho (ρ), which was associated with ER service utilization (OR 0.46, 95% CI 0.3-0.6 for males and OR 0.60, 95% CI 0.5-0.7 for females, p<0.001).

There is a higher tendency among young people with psychosocial problems to utilize ER services. The individual style of health behaviour predicts ER service utilization, especially among females. Healthcare providers should pay particular attention to the health behaviours and mental health of young people who recurrently use ER services.

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Introduction

Emergency room (ER) services offer walk-in medical treatment for patients with acute unexpected health complaints. In Finland, most people use public primary healthcare services such as ER services, which are of a high standard and available to everyone. The immediacy and the severity of the objective need for medical care are expected to determine the decision to use ER. However, factors other than those related to the medical condition could influence the decision to seek help from ER services.

The utilization of ER services increases in adolescence and young adulthood (1,2). Common reasons leading to this increasing use in young people include musculoskeletal issues, injuries and respiratory tract infections (1). Concerning mental health issues, the most common conditions leading to the need for ER services are depression, conduct disorders, substance use and unspecified neurotic disorders (3). Injury-related emergency visits increase in puberty (4). In a Finnish ER survey, up to two-thirds of underage patients attending ER due to injuries were under the influence of alcohol (5).

Recurrent ER visits by adolescents have been associated with female gender, older age, mental health problems (6), socioeconomic deprivation (6,7), a poorer health status (8) and alcohol-related injuries (9). In a paediatric ER study, positive responses to a suicide screening questionnaire associated with repeated ER visits in children (aged 8-12) and psychiatric hospitalization in adolescents (aged 13-18) (10). In another paediatric ER study, a higher proportion of ER visits compared to all other visits to healthcare services associated with lower educational and income levels in the family and public (health) insurance (11).

Health behaviours are generally defined as any activity with the purpose of preventing disease and improving health and well-being. The non-medical reasons affecting healthcare-seeking behaviour can be divided into two groups. Firstly, there are differences between population groups in their care-seeking behaviour, e.g. between males and females or persons of different ages. These differences are observable in the same sense that they can be statistically explained by gender and age. Secondly, there are differences between individuals that cannot be statistically explained in a

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given data set ("unobserved heterogeneity" or "individual style"). The behavioural differences between individuals can be observed as variation in an individual's behaviour over time and variation in behaviour between individuals that cannot be explained by known and observable individual characteristics (12). Thus, individual health behaviours are more complicated than only defining the assortment of individual characteristics.

Panel data analysis is a statistical method that deals with two-dimensional (cross-sectional/time series) panel data, and in which data are collected over time and for the same individuals. This method enables the individual style of behaviour to be studied, as well as the existence and degree of individual heterogeneity, but not the variation in personal factors of the study subjects underlying it.

We investigated predictors of the utilization of ER services and the visit rate in 2005-2010 with a panel data model using both follow-up survey and register data from a primary healthcare ER unit. We investigated both known and unobserved factors associated with emergency room utilization among young people. The study addressed: 1) how health and psychosocial factors are associated with ER utilization and the visit rate, and 2) how large is the effect of the potential individual style in ER utilization. We focused on health and psychosocial characteristics such as participants' growth milieu and social relations, parental occupations, school performance, adverse experiences such as bullying or abuse, alcohol consumption in adolescence and young adulthood, and self-reported mental health and chronic health problems.

Methods

The participants belonged to follow-up study cohorts of the Adolescent Mental Health Survey. The baseline participants were pupils (age range 13-18 years) from comprehensive, upper secondary and vocational schools in Kuopio, a city in Eastern Finland with approximately 105 000 inhabitants. Data on participant characteristics and information on their physical and mental health were collected with structured self-report questionnaires (see Measurements section). Methodological details of the baseline study setting have previously been presented by Laukkanen et al. (2009) (13).

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The healthcare utilization data consisted of Kuopio primary healthcare registers from 2005 to 2010, and comprised general practitioner and nursing services in outpatient clinics, school and student healthcare units and ER services. Only the data regarding the utilization of ER services were used. ER services are located at Kuopio University Hospital, and are provided in collaboration with public primary and specialist medical care. The supply of services was constant throughout the follow-up period, comprising the health service supply of one city, Kuopio.

Participants of the original baseline cohort were gathered in 2004-2005. The target population comprised 6421 adolescents aged 11-21 years. The response rate at baseline was 65.5%, giving a sample of 4214 adolescents. A total of 43 questionnaires were excluded due to an age of 12 or younger or 19 or older, leading to a final sample of 4171 adolescents. From this population, 1827 (43.8%) provided consent to be contacted for a follow-up study. A young age, female gender and a high number of hobbies were associated with providing consent and study participation. A self-rated follow-up questionnaire accompanied by a return envelope was sent in 2010-2011 by mail to those who had provided consent to be contacted for a follow-up study and whose postal address could be ascertained (N=1585). Current postal addresses were obtained from the Finnish Population Register Centre. The questionnaire was re-sent up to two times to those whose response was not received within one month. Finally, those participants who did not answer and whose telephone numbers were public (N=409) were contacted by telephone. Altogether, 797 adolescents (70.9% girls) participated in the follow-up. Only those who gave consent to access medical records in the follow-up phase, who had any medical recordings and whose municipality of residence was Kuopio in 2005 were included (N=416). Identification codes were used to match follow-up survey data with healthcare register data.

For all primary healthcare visits, a) the number and reasons for the visits, b) the professional status of the healthcare person providing the service (physician/other) and c) the visit location, were gathered from the medical records of each individual. For each visit to primary healthcare, the main reason for the visit was determined from the medical records and classified according to the International Classification of Primary Care (ICPC) (14). Only visits to the ER were investigated. ER users were compared with those not using ER services (named non-users). Of the 416 participants (females 67.3%), 65 made a total of 895 ER visits during the 6 years of follow-up. However, the rest (351 non-users of ER) had visits to other primary healthcare services, such as student healthcare and an outpatient clinic. ER service utilization was consistent when compared by year (statistically non-significant in the chi-squared test). The formation of the final data set is presented in Figure 1. The reasons for ER visits are presented in Table 1.

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Figure 1. The target population and sample selection of the study.

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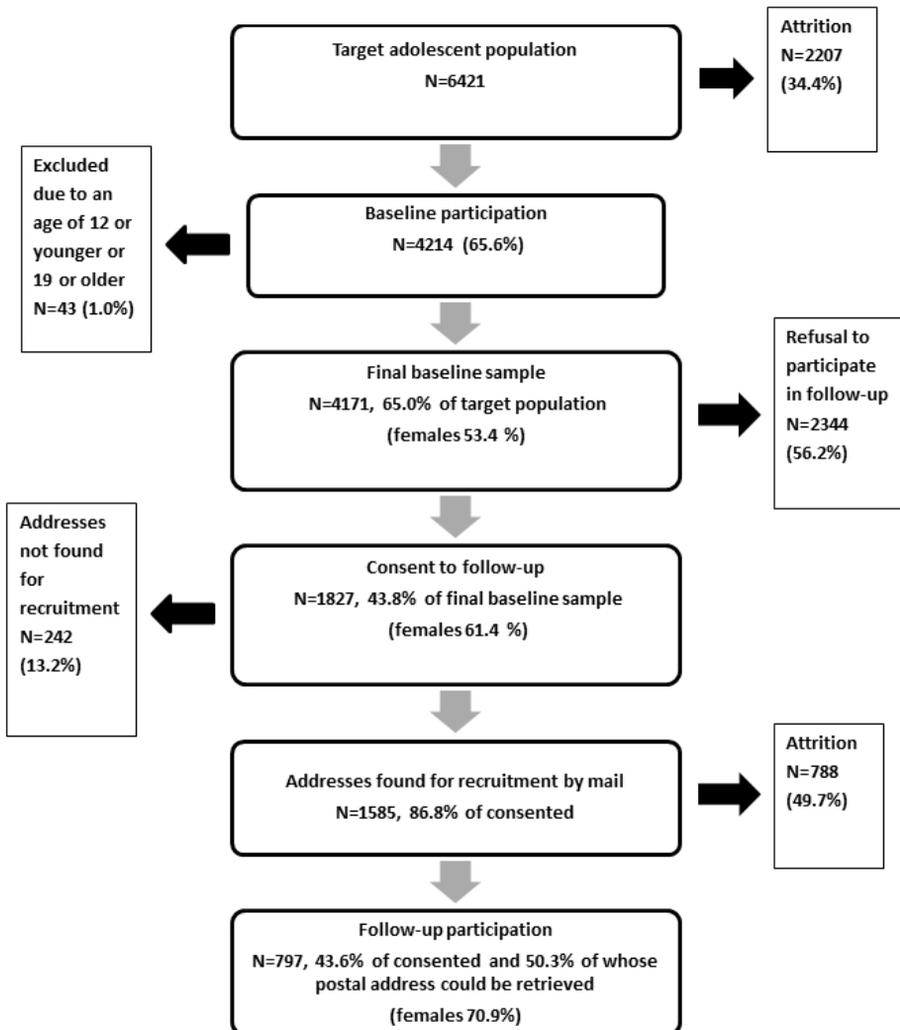adolescents and young adults

Table 1. Number and percentage of emergency room visits (N=895) between the years 2005 and 2010 according to the reasons.	
Reasons for emergency room visits	**All** **N (%)**
Respiratory tract, otorhinolaryngological	244 (27.3)
Other, non-specified[a]	165 (18.4)
Orthopaedic	110 (12.3)
Dermatological, allergies	90 (10.1)
Neurological	70 (7.8)
Injuries, non-specified	60 (6.7)
Gastroenterological	43 (4.8)
Urological	42 (4.7)
Psychiatric	34 (3.8)
Gynaecological	18 (2.0)
Heart, circulation	14 (1.6)
Endocrinological	3 (0.3)
Intoxications	2 (0.2)
Number of all reasons	895 (100)

[a] Other, non-specified such as non-medical reason

Measurements

Measurements and questionnaires at baseline in 2005

The sex and age of the study participants were inquired in the questionnaire. The parental occupations were reclassified as "white-collar worker" (higher employee or self-employed) or "blue-collar worker" (worker, lower employee or other). The marital status of the parents was reclassified as "married" (married or living with a partner) or "divorced" (divorced, separated or other). School performance was self-rated separately for Finnish (i.e. native language and grammar), mathematics and general subjects (such as science, history and religion) with a grading of "poor/below average", "average" or "good".

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The Alcohol Use Disorders Identification Test (AUDIT) (15) was originally designed for screening risky alcohol consumption in adults, but it is also sensitive in measuring problematic drinking behaviour in adolescents (16). We used the full version of AUDIT with a cut-off of equal to or greater than three for identifying alcohol problem use, abuse or dependence among adolescents (16).

Measurements and questionnaires at follow-up in 2011

Participants were asked to define their current marital status as "married", "living with a partner" or "single". The current mode of living was selected from the alternatives "living with a parent/parents" or "living alone/other accommodation". Each participant reported whether they currently studied ("yes" or "no") or worked ("yes" or "no"). Participants were also asked to report whether they currently or previously had any physician-diagnosed mental disorder. The AUDIT scores were used to evaluate alcohol use at baseline and at follow-up.

The participants were also asked about various forms of abuse or difficulties before the age of 16 years. The questions presented were: "Did your parents get divorced?" "Did you have long-term health problems?" and "Were you bullied at school?" Response alternatives were "yes," "no", or "I don't know". For the question: "Did your family have long-term economic difficulties, or were your parents unemployed?" answers were classified as "yes" or "no". Participants were also asked whether they had experienced emotional (yes/no), physical (yes/no) or sexual (yes/no) abuse in their childhood home when they were under the age of 16. Different forms of abuse were reclassified into a single variable with the values "none", "one form" or "two or more forms".

Data analysis

The chi-squared test was used to analyse group differences between emergency service users and non-users in categorical variables such as sex, parental occupation, school performance, marital status, mental health status, childhood abuse and alcohol consumption. The independent samples t-test was used to analyse group differences in the continuous variable age. We further modelled the utilization of ER services using panel data models to investigate whether these variables contributed to the use of ER services. Several preliminary regression models with different variable combinations

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were investigated before the final models. The final models were structured with specific interest in socioeconomic and psychosocial factors. Service use was first modelled as an annual binary variable (service use during 2005-2010, "yes" or "no"). Secondly, a negative binomial regression model was used to explain the total annual frequency of service use as a count variable. Thus, the incidence rate ratio (IRR) interprets increased risk by a one unit increase in variables. Missing observations were included in the analysis. Finally, to avoid possible sources of bias, logistic regression analysis was used to investigate the association between background variables and being or not being in the healthcare utilization data (N=416). First, baseline only (N=4171), and secondly, both baseline and follow-up (N=797) background variables were included in the regression analyses.

The total variation in the models can be divided into two sources: one is systematic variance, which is explained by the variables included in the model, and the other is non-systematic variance, which, in addition to sampling error, is variation explained by within-group variance, referred to here as individual style. The individual style (associated with time-invariant but unknown and unobserved individual characteristics) is given by the proportion of the total variance contributed by the panel-level variance component Rho (ρ). The parameter ρ measures the proportion of the total variance associated with unexplained individual differences in the utilization of ER services. The variance in ER service utilization is divided into two components: the total variance and panel-level variance. The formula for ρ is: $\rho = \sigma i^2 / (\sigma i^2 + \sigma e^2)$, i.e. variance contributed by the individual style/total variance. When ρ approaches zero, the style differences (panel-level variance component) are small and thus unimportant, and the panel estimator is no different from the pooled estimator. If ρ approaches one, the style differences (proportion of the individual style) increase, and the variation within individuals from one year to another, decreases. With ρ values near one, the individual style of health behaviour determines the use of ER: some persons visit the emergency room from year to year independent of their known and observed characteristics, while others with the same characteristics do not attend the ER.

The models were first estimated for the whole group and then for females and males separately. p-values below 0.05 were considered to indicate statistical significance. All the models were tested for multicollinearity, and all variance inflation factors (VIF) were less than 5. All of the analyses were conducted with SPSS (version 19.0) and STATA (version 11.2) statistical software.

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Results

Sample characteristics

Females comprised 280 (67.3%) of the 416 participants and accounted for 708 (79.1%) of the 895 ER visits. There were 65 participants with at least one visit during 2005-2010. The mean number of emergency room visits during six years was 2.5 among females and 1.4 among males. The characteristics of participants are presented in Table 2.

Factors associated with one or more visits to ER: Results from logistic regression analysis

Poor or below average school performance compared with good school performance in the native language and average school performance in general subjects associated with emergency visits among males. A baseline AUDIT score of more than 3 associated with ER visits among females. ER visits associated with current mental health problems among males, but with previous mental health problems among females. Among females, not currently working or studying associated with ER visits. In these models, the relatively high ρ values (OR 0.46 for males and OR 0.60 for females) indicate that individual style significantly contributes to the utilization of emergency services. The higher value for females compared to males indicates a gender difference, whereby the style effect is larger among females than males (Table 3).

Factors associated with the total frequency of ER visits: Results from negative binomial regression analysis

Female gender associated with a higher ER visit rate. A lower paternal occupational status among both genders and a lower maternal occupation status among female participants associated with a higher ER visit rate. Among males, poor or below average school performance as compared to good school performance in the native language, and poor or below average school performance as compared to average school performance in general subjects increased the ER visit rate. Having no long-term health problems was associated with a higher ER visit rate among females. Among females, being single and not currently working or studying associated with a higher ER visit rate, while among males, a higher visit rate associated with current mental disorders. Females reporting no parental divorce under the age of 16 visited the ER

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less frequently. Conversely, among both genders, two or more forms of abuse were associated with higher ER visit rates. In the negative binomial regression, the likelihood ratio test also demonstrated the existence of a statistically significant unobserved heterogeneity, i.e. individual style effect (Table 4).

Factors associated with being in the healthcare utilization data: Results from logistic regression analyses

From the baseline questionnaire characteristics alone, female gender (OR 2.0, 95% CI 1.6-2.6, p<0.001) and younger age in both genders (OR 0.8, CI 0.7-0.9, p<0.001) associated with being in the healthcare utilization data. In analysis with both baseline and follow-up questionnaire characteristics, a younger age in both genders and a white-collar worker occupational status of the father in males associated with being in the healthcare utilization data. From the follow-up characteristics, living with the parents compared to living alone or in other accommodation in both genders and abuse in females associated with being in the healthcare utilization data (Table 5).

Table 2. Characteristics of adolescents and young adults (N=416) from the follow-up cohorts in 2005 and 2011, and a comparison of emergency room users and non-users during 2005-2010.

Variables		Emergency room utilization				p-value[a]
		1 or more visits N=65 (15.6%)		No visits N=351 (84.4%)		
Baseline questions in 2005		Mean	SD	Mean	SD	
Age	Years	15.3	(1.49)	15.1	(1.53)	0.26[b]
		N	%	N	%	
Sex	Girl	45	69.2	235	67.0	0.72
	Boy	20	30.8	116	33.1	
Paternal occupation	White-collar worker	25	38.5	133	37.9	0.90
	Blue-collar worker	35	53.9	196	55.8	
	Missing data	5	7.7	22	6.3	
Maternal occupation	White-collar worker	24	36.7	132	37.6	0.99
	Blue-collar worker	37	56.9	199	56.7	
	Missing data	4	6.2	20	5.7	
Parental marital status	Married/Living with a partner	40	61.5	234	66.7	0.72
	Divorced/Other	24	36.9	112	31.9	
	Missing data	1	1.5	5	1.4	
School performance						
Native language	Poor/Below average	12	18.5	26	7.4	0.02
	Average	39	60.0	243	69.2	
	Good	14	21.5	82	23.4	
Mathematics	Poor/Below average	23	35.4	110	31.3	0.78
	Average	29	44.6	172	49.0	
	Good	13	20.0	69	19.7	
General subjects	Poor/Below average	11	16.9	43	12.3	0.25
	Average	35	53.9	226	64.6	
	Good	19	29.2	81	23.1	
AUDIT[c] score in 2005	0 - 2	26	44.1	199	61.0	0.02
	3 or more	33	55.9	127	39.0	

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Variables		Emergency room utilization				
		1 or more visits N=65 (15.6%)		No visits N=351 (84.4%)		p-value[a]
Follow-up questions in 2011						
Marital status	Married/Co-habitation	29	44.6	127	36.3	0.20
	Single	36	55.4	223	63.7	
Current mode of living	Living with parent/ parents	11	16.9	97	27.8	0.07
	Other accommodation	54	83.1	252	72.2	
Currently working or studying	Yes	33	50.8	202	57.6	0.42
	No	32	49.2	146	41.6	
	Missing data	0	0.0	3	0.7	
Mental disorders	No	47	72.3	276	78.6	0.17
	Yes, previously	12	18.5	35	10.0	
	Yes, currently	6	9.2	33	9.4	
Adverse childhood experiences before age 16 Parental divorce	Yes	24	36.9	117	33.3	0.07
	No	39	60.0	230	65.5	
	Cannot say	2	3.1	1	0.3	
Chronic health problems	Yes	54	83.1	286	81.5	0.81
	No	11	16.9	63	17.9	
	Cannot say	0	0.0	2	0.6	
Bullying at school	Yes	23	35.4	99	28.2	0.68
	No	40	61.5	238	67.8	
	Cannot say	2	3.6	13	3.7	
	Missing data	1	0.2	1	0.3	
Long-term economic difficulties in the childhood home	No	45	69.2	274	78.1	0.12
	Yes	20	30.8	77	21.9	
Abuse, emotional, physical, or sexual	None	43	66.2	276	78.6	0.05
	One form	11	16.9	46	13.1	
	Two or more forms	11	16.9	29	8.3	
AUDIT[c] score in 2011	0 - 2	13	20.0	70	20.0	1.00
	3 or more	52	80.0	280	80.0	

[a]Chi^2, [b] Independent samples t-test
[c]AUDIT=Alcohol Use Disorders Identification Test

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Table 3. OR[a] (95% CI) for emergency room utilization in relation to background variables (N=414)[b].

Variables	All OR	(95% CI)	p-value	Males OR	(95% CI)	p-value	Females OR	(95% CI)	p-value
Baseline questionnaire in 2005									
Year									
2005	1.0			1.0			1.0		
2006	0.9	(0.7-1.1)	0.48	0.6	(0.4-0.9)	0.02	1.0	(0.8-1.3)	0.71
2007	1.2	(1.0-1.5)	0.08	1.8	(1.1-2.9)	0.02	1.1	(0.9-1.4)	0.29
2008	1.3	(1.1-1.7)	0.006	0.7	(0.4-1.2)	0.22	1.6	(1.2-2.0)	<0.001
2009	1.3	(1.0-1.6)	0.04	0.4	(0.2-0.7)	0.002	1.6	(1.2-2.1)	<0.001
2010	1.7	(1.4-2.1)	<0.001	1.7	(1.0-2.8)	0.04	1.8	(1.4-2.2)	<0.001
School performance									
Native language									
Poor/Below average	1.0			1.0			1.0		
Average	0.7	(0.3-1.6)	0.37	0.7	(0.2-2.4)	0.57	0.7	(0.2-2.7)	0.60
Good	0.5	(0.2-1.4)	0.17	0.1	(0.0-0.6)	0.01	0.7	(0.2-3.1)	0.65
General subjects									
Poor/Below average	1.0			1.0			1.0		
Average	0.6	(0.3-1.2)	0.17	0.2	(0.0-0.6)	0.009	0.9	(0.4-2.3)	0.83
Good	0.6	(0.2-1.4)	0.19	0.4	(0.1-2.1)	0.29	0.5	(0.2-1.5)	0.23
AUDIT score in 2005									
0-2	1.0			1.0			1.0		
>3	1.7	(0.9-3.0)	0.09	1.7	(0.6-5.0)	0.36	2.1	(1.0-4.4)	0.047
Follow-up questionnaire in 2011									
Currently working or studying									
Yes	1.0			1.0			1.0		
No	2.0	(1.1-3.3)	0.01	1.1	(0.4-2.8)	0.82	2.2	(1.1-4.3)	0.02
Mental disorders									
No	1.0			1.0			1.0		
Yes, previously	4.0	(1.7-9.2)	0.001	8.6	(0.7-99.5)	0.09	3.1	(1.2-7.8)	0.02
Yes, currently	2.0	(0.8-4.8)	0.12	10.5	(1.9-59.6)	0.008	1.4	(0.5-4.2)	0.50
[c]Rho	0.6	(0.5-0.6)	<0.001	0.5	(0.3-0.6)	<0.001	0.6	(0.5-0.7)	<0.001

[a]OR=odds ratio. CI=confidence interval.

[b]Only significant results are reported. The model was also adjusted for gender, age, paternal occupation, maternal occupation, school performance in mathematics, marital status, current mode of living, the AUDIT score in 2011, bullying at school, parental divorce, abuse, chronic health problems and economic difficulties in the childhood home.

[c]Rho=When ρ approaches zero, the panel-level variance component is small. If ρ approaches one, the proportion of the variation between individuals increases, and the variation within individuals from one year to another, decreases.

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Table 4. IRR[a] (95% CI) for a high number of emergency room visits in relation to background variables (N=414)[b].

Variables	All IRR (95% CI)	p-value	Males IRR (95% CI)	p-value	Females IRR (95% CI)	p-value
Baseline questionnaire in 2005						
Sex						
Female	1.0					
Male	0.5 (0.3-0.7)	<0.001				
Age	1.2 (1.0-1.3)	0.009	1.2 (0.9-1.6)	0.18	1.1 (0.9-1.2)	0.30
Year						
2005	1.0		1.0		1.0	
2006	1.2 (1.0-1.3)	0.005	0.7 (0.5-1.0)	0.02	1.3 (1.1-1.4)	<0.001
2007	1.3 (1.2-1.4)	<0.001	2.1 (1.5-2.7)	<0.001	1.2 (1.1-1.4)	<0.001
2008	1.4 (1.3-1.6)	<0.001	0.9 (0.6-1.3)	0.58	1.5 (1.3-1.6)	<0.001
2009	1.1 (1.0-1.3)	0.049	0.6 (0.4-0.9)	0.02	1.2 (1.1-1.3)	0.004
2010	1.3 (1.2-1.5)	<0.001	1.3 (1.0-1.8)	0.07	1.3 (1.2-1.5)	<0.001
Paternal occupation						
White-collar worker	1.0		1.0		1.0	
Blue-collar worker	1.5 (1.1-2.1)	0.02	1.5 (0.7-3.2)	0.30	1.2 (0.8-1.9)	0.32
Maternal occupation						
White-collar worker	1.0		1.0		1.0	
Blue-collar worker	1.4 (1.0-1.9)	0.048	1.1 (0.5-2.4)	0.73	2.0 (1.3-3.0)	0.002
School performance						
Native language						
Poor/Below average	1.0		1.0		1.0	
Average	0.8 (0.5-1.3)	0.34	0.5 (0.2-1.5)	0.20	0.6 (0.2-1.3)	0.19
Good	0.5 (0.3-1.0)	0.05	0.1 (0.0-0.5)	0.006	0.5 (0.2-1.4)	0.18
General subjects						
Poor/Below average	1.0		1.0		1.0	
Average	0.6 (0.4-1.0)	0.03	0.3 (0.1-0.8)	0.02	0.8 (0.5-1.5)	0.54
Good	0.5 (0.3-0.9)	0.03	0.6 (0.2-2.4)	0.48	0.5 (0.3-1.1)	0.08
Follow-up questionnaire in 2011						
Marital status						
Married or living with a partner	1.0		1.0		1.0	
Single or other	1.7 (1.2-2.4)	0.002	1.9 (0.8-4.9)	0.17	2.6 (1.6-4.0)	<0.001
Currently working or studying						
Yes	1.0		1.0		1.0	
No	1.3 (1.0-1.8)	0.06	1.0 (0.5-1.9)	0.99	2.0 (1.3-3.1)	0.002
Mental disorders						
No	1.0		1.0		1.0	
Yes, previously	1.8 (1.1-2.8)	0.01	3.8 (0.4-35.7)	0.25	1.2 (0.7-2.1)	0.53
Yes, currently	1.1 (0.7-1.7)	0.74	5.9 (1.6-22.0)	0.008	1.6 (0.9-3.0)	0.12
AUDIT score in 2011						
0-2	1.0		1.0		1.0	
>3	0.6 (0.4-0.8)	0.002	0.8 (0.3-1.9)	0.61	0.4 (0.2-0.8)	0.004
Adverse childhood experiences before age 16						
Parental divorce						
Yes	1.0		1.0		1.0	
No	0.7 (0.5-0.9)	0.02	1.1 (0.5-2.3)	0.79	0.3 (0.2-0.5)	<0.001
Cannot say	1.2 (0.3-5.7)	0.78	1.0		0.8 (0.1-5.4)	0.80
Chronic health problems						
Yes	1.0		1.0		1.0	
No	2.8 (1.7-4.6)	<0.001	1.3 (0.2-6.8)	0.79	3.4 (1.9-6.1)	<0.001
Cannot say	2.8 (0.9-9.3)	0.09	0.1 (0.0-2.3)	0.14	5.0 (1.1-22.8	) 0.04
Bullying at school						
Yes	1.0		1.0		1.0	
No	0.6 (0.4-0.8)	0.004	1.0 (0.4-2.2)	0.92	0.7 (0.5-1.1)	0.13
Cannot say	0.3 (0.2-0.8)	0.008	0.0 (0.0-0.9)	0.04	0.3 (0.1-0.8)	0.01
Abuse						
None	1.0		1.0		1.0	
One form	0.5 (0.4-0.8)	0.007	0.6 (0.1-4.5)	0.66	0.4 (0.2-0.8)	0.004
Two or more forms	2.7 (1.5-4.8)	0.001	3.3 (0.6-17.6)	0.16	1.8 (0.9-3.5)	0.09
[c]LR test		<0.001		<0.001		<0.001

[a]IRR=Incidence rate ratios. IRR interprets an increased risk as a 1 standard deviation (SD) increase in scale scores. CI=Confidence interval. p-value: * <0.050, **<0.010, ***<0.001

[b]Only significant results are reported. The model was also adjusted for school performance in mathematics, the AUDIT score in 2005, the current mode of living and economic difficulties in the childhood home

[c]LR=Likelihood ratio test, panel vs. pooled

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Table 5. OR[a] (95% CI) for being in the emergency room data in relation to background variables from study points one and two (N=734)[b].

Variables	All			Males			Females		
	OR	(95% CI)	p-value	OR	(95% CI)	p-value	OR	(95% CI)	p-value
Baseline questionnaire									
Age	0.8	(0.7-0.9)	<0.001	0.7	(0.5-1.0)	0.032	0.8	(0.7-0.9)	0.001
Paternal occupation									
White-collar worker	1.0			1.0			1.0		
Blue-collar worker	0.7	(0.5-1.0)	0.031	0.4	(0.2-0.9)	0.028	0.7	(0.5-1.1)	0.164
Follow-up questionnaire									
Current mode of living									
Living with parent/parents	1.0			1.0			1.0		
Other accommodation	0.2	(0.1-0.4)	<0.001	0.3	(0.1-0.8)	0.024	0.2	(0.1-0.5)	<0.001
Adverse childhood experiences before age 16									
Abuse: emotional, physical or sexual									
None	1.0			1.0			1.0		
One form	1.8	(1.1-3.0)	0.029	1.3	(0.2-7.5)	0.788	1.8	(1.0-3.2)	0.036
Two or more forms	0.8	(0.5-1.5)	0.584	0.7	(0.2-3.4)	0.68	0.8	(0.4-1.6)	0.626

[a]OR=Odds ratio. CI=Confidence interval

[b]Only significant results are reported. The model was also adjusted for gender, maternal occupation, school performance in the native language, mathematics and general subjects, the AUDIT score in 2005, marital status, currently working or studying, bullying at school, parental divorce, chronic health problems, economic difficulties in the childhood home, mental disorders and the AUDIT score in 2011

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Discussion

A lower school performance at baseline associated with ER service utilization among males, and not studying or working at the follow-up among females. Female gender, a lower parental socioeconomic status and childhood psychosocial problems increased the utilization rate of ER services. In addition, mental health problems among males and being single among females associated with an increased ER service visit rate. An individual style, measured as unobserved heterogeneity, was also observed in ER service visits. The proportion of the individual style in ER service utilization was larger among females than males.

ER utilization by adolescent and young adult females was greater than that of males, which is in line with the previous literature (6). In addition, recurrent ER visits by adolescents have been suggested to be related to socioeconomic deprivation (6,7). Socioeconomic distress, such as a low educational level and low income, has also been related to frequent ER use by adults (17). In parallel with this, in our study, a lower parental occupational status among males and not being at school or at work among females increased ER utilization. Health behaviour and style of healthcare service utilization may have been learned from the childhood family and social environment. These study findings are in line with public health statistics, in which socioeconomic deprivation is related to a poor health status (18).

Among adults, long-term illnesses and the use of other health resources were related to higher ER utilization (17). Surprisingly, in our study, females without long-term somatic illness in childhood had higher ER visit rates. It may be possible that adolescents with long-term somatic problems have learned to take care of their health and use non-ER services more often compared to their peers. Mental disorders, both current and previous disorders among males and previous disorders among females, associated with ER visits. Mental health problems could be related to risky behaviour and therefore to increased ER utilization. In previous studies among adolescents, mental health problems have predicted higher ER utilization (6,10). In adult studies, frequent ER visits have also been associated with psychological distress and mental health problems (17,19,20).

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The number of recurrent emergency visits has been reported to be higher due to alcohol-related injuries in adolescents (9). Among adults, an association has been observed between problem drinking and increased ER visits (14,16,21). In our study, hazardous alcohol use in adolescence (age 13-18 years) was related to ER service utilization, but not to the frequency of ER visits. No such relationships were observed in young adults (aged 19-24) with an AUDIT score cut-off of three. This might be explained by the difference in alcohol use among adolescents and young adults, with higher AUDIT scores in adults compared to adolescents.

In our study, the effect of unobserved heterogeneity, i.e. an individual style in ER utilization, was found for both genders. Our results appear to indicate that this style is more endemic among females than among males. In practice, this means that the utilization of emergency services for males is more random than for females. For instance, the age variables have low significance for males. Previous studies have described individual factors related to ER utilization. However, we have found no previous studies on the individual style in ER utilization measured with unobserved heterogeneity.

Participants in the ER study data were more often females, young and living with their parents when compared to participants who dropped out from this study. Moreover, a higher paternal occupational status in males and experiences of abuse in childhood or adolescence in females related to being in the ER data. In the study results, a history of a lower socioeconomic status and abuse increased ER utilization in both genders. Despite our analysis of the contribution of background factors, it remains unknown whether these characteristics caused bias in the selection of the participants.

The individual style and psychosocial problems among young females with frequent ER utilization need to be discussed. It is possible that some adolescents and young adults prefer to use ER instead of choosing to wait for an appointment at a healthcare centre. It is also possible that some young people with several untreated somatic and mental health problems use ER services in the event of a health crisis. Such differences in healthcare service utilization might be related to difficulties in life management or social exclusion. There might be inabilities such as difficulties in making long-term decisions concerning health and predicting healthcare needs, or in using the booking systems of the healthcare services. It might also be possible that at a young age, psychosocial problems in females are more often related to healthcare service utilization than in males.

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Strengths and limitations

The supply of healthcare services remained constant during the research period. The high utilization rate of public healthcare services in Finland allowed us to obtain a comprehensive study sample. However, self-reporting of healthcare use is more vulnerable to bias, especially in cases of potentially embarrassing health complaints. Compared to relying solely on self-report data, access to medical records offered more exact data on actual healthcare visits. We were able to examine the exact number and date of emergency visits, and therefore use the panel data model.

The high drop-out rate must be considered as a limitation. Moreover, the nature of the self-report questionnaire as an information source must be considered as a possible limitation. More systematic recording of the reasons for and/or diagnosis from primary healthcare visits would have improved our data. Furthermore, the sample did not include adolescents who were absent from school at the time of the survey, which needs to be taken into account while interpreting our results. Nevertheless, age and gender were taken into account in the regression analyses. Moreover, possible selection bias in the data were investigated in relation to background variables. However, somatic and mental health reasons for ER visits were not investigated separately due to the small number of reported mental health reasons. Furthermore, utilizing structured clinical interviews to obtain diagnoses would have been a more exact means to evaluate the mental health status than self-reported questionnaires. Nevertheless, due to the large sample size of the study, we were unable to utilize such tools in this data set. Questionnaire responses from 2005 and 2011 were used in the same regression models to explain ER utilization during 2005-2010, which has to be considered as a limitation when interpreting the causality of the results. Only those who participated in the follow-up gave consent to an investigation of their medical records, and the effect of consenting was not therefore examined.

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Conclusions

Both known individual characteristics and unobserved heterogeneity predicted ER utilization in adolescents and young adults. There are higher tendencies for ER utilization among females with psychosocial problems and males with school problems and mental health issues, which is in line with the previous literature, and suggests health behaviour differences between genders and socioeconomic groups. The above-mentioned psychosocial difficulties related to ER utilization are also closely related to severe problems in life management, such as social exclusion. An unexplained individual style also predicts personal ER utilization among adolescents and young adults. In this study, the effect was larger among females than males.

The results from this specific study sample and setting are relevant to clinical practice and models of healthcare services. There are needs to improve healthcare services and the social support of young people in a variety of locations. Providers in all healthcare settings should be aware that several individual characteristics, including psychosocial concerns, influence the rate of ER use.

Young people with no access to student or occupational healthcare services might experience ER as the most feasible source of healthcare. Other possible reasons for relying on ER services might be intense worry related to one's health, hopes for an immediate solution to the current health issue and being inexperienced in using the healthcare systems. Nevertheless, encountering young persons in an ER setting might also offer the possibility of having an impact on individual health behaviours and the style of using healthcare resources.

Healthcare providers should be aware of the style of health behaviour and the psychosocial problems of adolescents and young adults who recurrently use ER services. More research is needed to clarify whether these gender differences in ER service utilization can be generalized to other adolescent and young adult populations. Further investigation of individual heterogeneity and its components underlying the utilization of healthcare services might be very valuable for clinical practice and public health.

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Associations between self-rated depressive symptoms and quality of life in Finnish males aged 30 to 40

Eija Ohvanainen, Hannu Kautiainen, Ilkka Kiviranta, Hannu Koponen

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Abstract

Depression is a common and disabling disorder which profoundly affects the quality of life of sufferers. However, few studies have been conducted in young or middle-aged males, although depression and cardiometabolic disorders are considered to be increasingly common in middle-aged males.

In our study, three cohorts, each of 1000 males were randomly drawn from the Finnish Population Information System. Approximately one-third (30.5%) participated. Self-rated depressive symptoms were assessed using the 21-item Beck's Depression Inventory (BDI). Physical activity was assessed using the International Physical Activity Questionnaire, which comprises three components: frequency of exercise (times per week), intensity of exercise (the nature of the activity) and time devoted to exercise (hours and minutes per day). The different components of quality of life were scrutinized with the RAND 36-item Health Survey (RAND-36).

We observed that when assessing the participants, with or without increased depressive symptoms, significant differences were detected for employment and economic status, level of physical activity, the use of alcohol and working ability. Significant reductions in the RAND-36 physical symptoms scores associated with increased depressive symptoms were detected only for the oldest cohort, whereas mental symptom scores were significantly lower in all cohorts for those participants who had increased depressive symptoms.

Our data suggest that even moderately increased depressive symptoms significantly affected the mental components of quality of life in all three cohorts aged 30, 35 and 40, and that they affected the physical components significantly in the oldest cohort (males aged 40).

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Background

Depressive disorders are a leading cause of global disease burden (1). Major depressive disorder has lifetime prevalence estimates of up to 17% in general populations (2). The 12-month prevalence figures for depressive disorders in Finland have been between 5 and 7 per cent (3). Moreover, the impact of depression on health-related quality of life (HRQoL) is comparable to that of a major chronic physical disease. A recent Finnish study investigated how 29 common chronic diseases associated with individual level HRQoL loss, and found that depressive disorders (major depressive disorder and dysthymia) were among the most severe conditions after Parkinson's disease (4). Moreover, depressive disorders have also been associated with higher mortality (5,6,7) and reduction in physical functioning (8,9).

According to the Diagnostic and Statistical Manuals DSM-IV and DSM-5 of the American Psychiatric Association, a major depressive episode is diagnosed by a standardized interview, and the diagnosis is based on a set of diagnostic criteria. Apart from a clinical assessment, there is a long-standing tradition of self-report measures of depressive symptoms that also allows for an assessment of depression symptom severity. Although an association between increased depressive symptoms and diagnosis of depressive disorder is assumed (10), increased depressive symptoms are also associated with decreased economic earnings, due to sickness absence and even early retirement (11). In addition, extensive evidence exists that demonstrates independent, positive associations between depressive symptom levels and poor health outcomes, including the experience of pain (12,13).

Subjective (usually self-rated) health also reveals important details regarding an individual's health needs (14), functional status/disability (15) and mortality (16,17).

The objective of this study was to investigate the associations between self-rated depressive symptoms and quality of life (QoL) in Finnish males aged 30-40. This age group is seldom studied although depression and cardiometabolic disorders are considered to be increasingly common in middle-aged males.

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Material and methods

Subjects and design

The study is based on cross-sectional data gathered in 2010. Three samples, each comprising 1000 males represented three cohorts born in 1969, 1974 and 1979, were included in the study. The participants were randomly drawn from the Finnish Population Information System, which is a computerized national register that is maintained by the Population Register Centre. Convicts, immigrants and mentally disabled males were excluded from the study. The draw covered the whole nation and was not weighted, and was thus representative. Women have served in the Finnish Defence Forces since 1995, but as the focus of the study was on the health of young men the females were excluded.

The participation in the study was voluntary and anonymous. All 3000 potential participants were contacted twice via mail and were provided with an information sheet, an informed consent form that they had to sign if they agreed to participate, questionnaires and also a return envelope. Those who had decided to take part in the study were provided with an opportunity to obtain additional information on the study and its proceedings, and they were allowed to withdraw from the study at any phase and were not obliged to give a specific reason for the withdrawal. The study protocol was approved by the Ethics Committee of the University of Helsinki, and permission for the study was given by the Finnish Defence Forces in 2009.

Primary Study Variables

Depressive symptoms: self-rated depressive symptoms were assessed using the 21-item Beck's Depression Inventory (18). The cut-off point of 10 was used.

Quality of life: The participants completed the RAND 36-item Health Survey (RAND-36), which is a widely used quality of life (QoL) measure (19,20). All eight SF-36 subscores in this study (physical functioning, social functioning, role limitations due to physical problems, role limitations due to emotional problems, mental health, energy/vitality, pain perception and general health perception) were taken into consideration. Two higher order summary scores, the Physical Component Summary (PCS) and the Mental Component Summary (MCS) that represent overall physical and mental functioning, were derived from these eight subdomains as specified by the original developers (21).

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Secondary study variables

The participants' *physical activity* was assessed by using the International Physical Activity Questionnaire (IPAQ), which comprises three components: frequency of exercise (times per week), intensity of exercise (the nature of the activity) and time devoted to exercise (hours and minutes per day). The product of these components indicates the level of physical activity of the participant (22).

Data on self-reported employment, economic status and use of alcohol and data on the participants' working ability were also gathered.
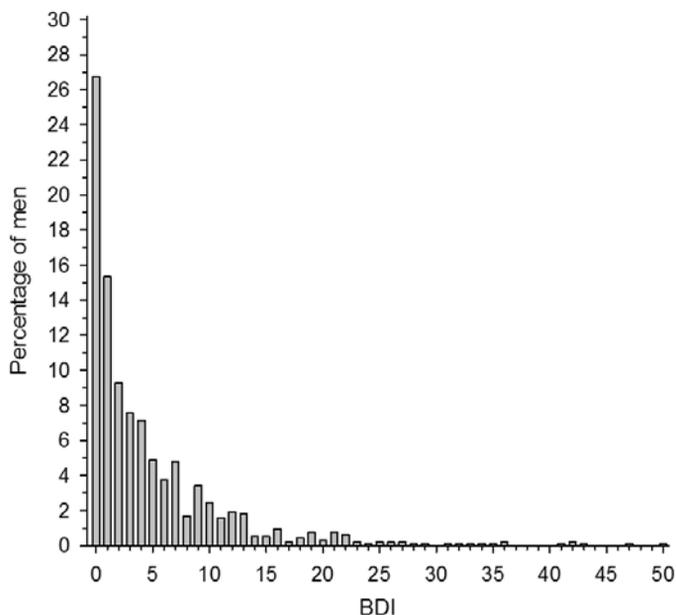
Statistical analysis

Data are presented as means with standard deviations (SD) or as counts with percentages. Moreover, 95% confidence intervals are given to the most important outcomes. Statistical comparison between the groups was performed by the Student's t-test, or by Analysis of Variance (ANOVA) when appropriate. Categorical data were evaluated by the Chi-squared test. In the case of any divergence from these assumptions (e.g. non-normality), a bootstrap type test was used. The normality of variables was evaluated by the Shapiro-Wilk W test.

Results

The response rate was 30.5%, the final total study population being 939. Two groups were formed from this population based on the reported BDI score, the cut-off point being 10. A total of 145 males/participants (15.4%, 95% CI 13.2 to 17.9) reported BDI scores of 10 or above (Dep+). The remaining 794 participants (84.6%) reported BDI scores less than 10 (Dep-). Figure 1 shows the distribution of reported BDI scores which reveals that the BDI scores reported were rather low in the Dep+ group. The mean BDI score was 4.7 (SD 6.7), range 0-50.

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Figure 1. Distribution of the BDI scores.

When the two groups (Dep+/Dep-) were compared to each other, statistically significant differences (p<0.001) were detected when assessing the participants' employment and economic status, their level of physical activity, use of alcohol and working ability. The difference is especially notable when it comes to self-reported working ability in relation to the mental requirements for work: only 48% of Dep+ males considered their working ability as being adequate compared to 94% of Dep- males. The corresponding figures for the physical requirements for work were 67% vs. 90%. Dep+ males were more likely to be unemployed (13% vs. 5%) and to draw a disability pension (9% vs. 2%). Reported increased depressive symptoms in this study also suggest higher alcohol consumption and less physical activity (Table 1).

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Table 1. Characteristics of the men who completed/responded to the questionnaire: means (SD).			
	BDI<10 (Dep-) N=794	BDI>=10 (Dep+) N=145	p-value
Cohort			
1969	259(33)	46(32)	
1974	249(32)	49(34)	
1979	286(36)	50(34)	0.76
Employment status			
Employed	714(90)	106(73)	
Student	22(3)	7(5)	
Unemployed	41(5)	19(13)	
Disability pension	13(2)	13(9)	<0.001
Economic status: self-reported sufficient income, N (%)	586(74)	65(44)	<0.001
IPAQ, mean(SD)	46(23)	33(23)	<0.001
Use of alcohol/12 months, N (%)	41(5)	18(12)	<0.001
<=12 units/week, N (%)	139(18)	49(34)	<0.001
No work-related disability reported, N (%)	566 (72)	57(39)	<0.001
Sufficient working ability regarding requirements for work*, N (%)			
Physical requirements	708 (90)	97 (67)	<0.001
Mental requirements	742 (94)	69 (48)	<0.001

Dep+ males reported lower HRQoL than Dep- males as measured by the SF-36. This result was patent for all eight subdomain scores. The difference was most obvious for the subdomains of energy/vitality, role limitations due to emotional problems, social functioning and mental health. PCS/MCS scores were also formed for both groups in each cohort. Significant reduction in the PCS score reported by the Dep+ group was detected only in the oldest cohort, whereas MCS scores of Dep+ males were significantly lower than those reported by Dep- males, irrespective of the cohort (Fig 2).

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Figure 2. RAND-36 results among different age cohorts.
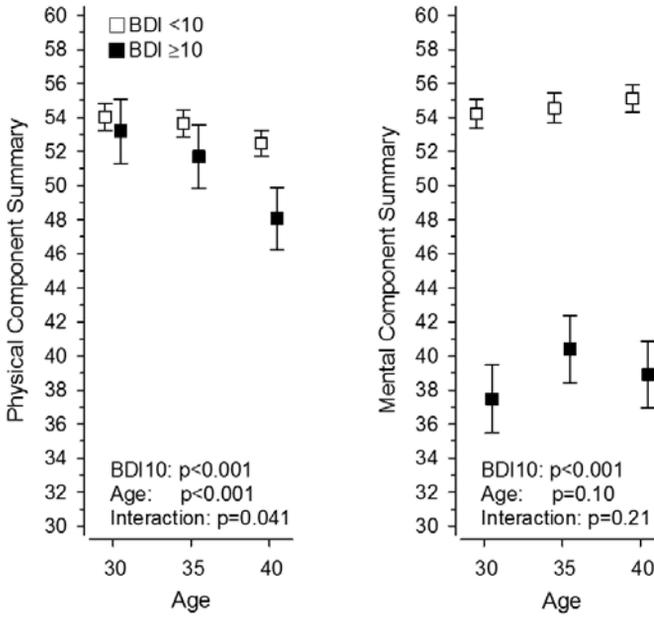
PCS: 30 p=0.53, 35 p=0.14, 40 p=0.003, MCS 30 p<0.001, 35 p<0.001, 40 p<0.001

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Discussion

Key findings

The novel finding of the study is that even a modest increase in self-rated depressive symptoms associated significantly with the mental aspects of QoL in all cohorts. However, increases in the self-rated depressive symptoms that accompanied poorer physical QoL were present only in the oldest cohort. These results are consistent with those reported by Wells et al. (23) and Saarni et al. (4), which suggest that HRQoL is impaired among individuals suffering from depression or depressive symptoms. The latter result is in line with the findings of Surtees et al. (8) who suggested that depressive and anxiety disorders have a profound, independent impact on functional health of older (aged 40-74 years) men and women. In addition, our study shows that the effects of increased depressive symptoms, even mild symptoms, on the mental component of QoL are even more profound and can also be detected in younger cohorts.

The results suggest that males with increased depressive symptoms are more likely to be unemployed, lack economic resources and have work-related disability. The difference is especially notable when it comes to working ability in relation to the mental requirements for work, as only half of the males with increased depressive symptoms considered their working ability sufficient in this regard. Depressed males were more likely to be unemployed and to draw a disability pension. This is in line with previous studies that have shown depressive symptoms are more common among individuals in lower socioeconomic groups, and that more severe depressive symptoms or depressive disorders are associated with lower income (24,25,26). Previous qualitative and quantitative studies also support the data that depressive symptoms alter the affective and instrumental attitudes toward taking physical activity (27,28,29,30,31). The results of this study are well in line with these findings as the Dep+ males seemed to be physically less active than their Dep- counterparts. This is noteworthy because the anti-depressive benefits of physical activity are well evidenced: they can be equal to or sometimes stronger than cognitive behavioural therapy or medication (32,33).

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Strengths and limitations

The strength of this study is that cohort comparisons allow the assessment of how increased depressive symptoms associate with the mental and physical components of QoL in different age groups. Depressive symptoms and quality of life were measured by validated, frequently used and commonly accepted instruments, which is also a strength. The low response rate is a clear limitation, and due to the cross-sectional nature of the study we cannot draw causal relationships. We had no data from the non-responders and thus we could not include any data from them in our analyses.

Conclusions

The results of the study suggest that even a modest increase in self-rated depressive symptoms can significantly affect the mental components of QoL in younger males, and that they can also significantly affect the physical components in an older cohort (men aged 40). The results also suggest that screening depressive symptoms in younger cohorts and paying attention to even modestly increased symptoms could be worthwhile, as these seem to associate with increased risk of major depressive episodes and chronic depression [34].

Declarations

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Determinants of costs of care for patients attending primary care

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Abstract

Aims: We aimed to evaluate determinants of costs of somatic and psychiatric care for patients attending primary care (PrC).

Methods: 495 PrC patients filled in a questionnaire including questions on background, health behaviour, social contacts, perceived health and depressive symptoms. Costs of somatic and psychiatric care were obtained from the local healthcare register.

Results: During 5 years' follow-up, total inflation-adjusted costs of care were 8145 Euros per capita in 2010 prices: 87.2% was due to somatic and 12.8% to psychiatric care. Age associated positively, but being single and working associated negatively with costs of somatic care. Costs of psychiatric care were high in young adults, single, divorced, unemployed, smokers, and those with few social contacts. In zero-inflated multivariate modelling, poor perceived health and being retired increased probability of seeking somatic care. Depressive symptoms and being unemployed increased, and old age decreased probability of seeking psychiatric care.

Concerning both services together, poor perceived health and being retired associated with increased, but depressive symptoms with decreased likelihood of being a service user. Among service users, age group 25-44 and having poor perceived health associated with higher costs of care. Female gender, being single, employed, having low education level, regular user of alcohol and regular physical exercise associated with lower costs of care.

Conclusions: In patients attending PrC, more than a tenth of total costs of care were due to psychiatric care. Patients' perceived health associated with costs of somatic, and depressive symptoms with costs of psychiatric care. Sociodemographic background also associated with costs of care.

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Introduction

The majority of people with health problems seek treatment from primary care (PrC). In Finland, 64% of the population over 15 years old attended a PrC physician in 2006 [1]. PrC patients often suffer from mental health problems: a majority from depression or depressive symptoms [2,3]. When evaluating costs of care of PrC patients, it is reasonable to also consider possible costs of psychiatric care.

As commensurable factors, costs of care are suitable for comparative (out- vs. inpatient care and somatic vs. psychiatric care) as well as for predictive research, rather than number of outpatient visits and hospital days. Costs of care describe precisely the treatment services that society provides for its members. Prospective predictive studies are needed to give insight into the factors that may influence service utilization costs [4].

Costs of care are divided into direct and indirect costs. Direct costs include all healthcare and also non-healthcare costs. Indirect costs include lower work productivity or inability to carry out household tasks [5]. In the present study, we concentrate on direct healthcare costs.

First, we aimed to estimate annual costs of somatic and psychiatric care in patients attending primary care during a 5-year follow-up period. Secondly, we aimed to predict costs of care by baseline characteristics. Perceived health was used as a clinical predictor for use of somatic services and depressive symptoms for use of psychiatric services. Non-clinical predictors comprised sociodemographic background, health behaviour and social contacts.

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Methods

The study protocol was approved by the Ethics Committee of the University of Turku and the Turku University Central Hospital. The research permits were given by the chief doctors of the two healthcare centres participating in the study, and financially the study was funded (EVO funding) by Turku University Central Hospital.

Study patients

The study was carried out in two small towns belonging to the healthcare district of South West Finland. The study leader (RKRS) first made an agreement with the chief doctors of the healthcare centres for recruiting patients into the study. The study subjects, over 15 years old, were recruited from healthcare centres between April 2005 and September 2005. Consecutive patients attending a PrC physician on randomly selected days during office time were asked by the research assistant, who also selected the study days, to participate in the study. Altogether, 959 PrC patients were invited, 394 refused. No data concerning the patients who refused were recorded. Data on annual costs of care between 2005 and 2010 were obtained from 495 (87.6%) out of 565 eligible participants. The first study visit was not included into the cost analyses. Thus, some of the 70 PrC patients without cost data made only one (study) visit to the study services, some may have attended other services not included in the present study (e.g. private services) and some had, after the study, visit moved away from the study healthcare district.

The PrC patients with cost data were more often women (p=0.022), older (p=0.021) and retired (p=0.004), but less often single (p=0.021) than the 70 PrC patients without cost data.

Examinations

Before seeing a doctor, all participants completed a questionnaire comprising questions on demographic background, tobacco smoking, use of alcohol, physical exercise, social contacts, depressive symptoms (DEPS) [3] and perceived health (1. very good, 2. good, 3. average, 4. bad, 5. very bad). Health behaviour and social contact variables were dichotomised as follows: smoking; regular daily smoker vs. temporarily/non-smoker, use of alcohol; weekly vs. rarely/never, physical exercise; breathless at least twice a week vs. non-breathless/not at all, social contacts; >2 vs. 0-2. The DEPS includes 10 rated questions on depressive symptoms, and its sum score (range 0 to 30) indicates severity of non-clinical depression.

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Cost of care

Costs of services used in Euros were obtained from the register of the healthcare district and collected annually between 2005-2010 so that after the baseline visit, a full 5-year period was included (the baseline visit was not included in cost analyses). Costs were then adjusted according to the healthcare price index provided by Statistics Finland [6] using 2010 as a reference year. The cost of a visit was estimated by its duration and professional grade of the service provider. Accordingly, the cost of a hospital day was estimated by the resources used for the patient's treatment. Both costs were determined once a year. In Finland, costs of public healthcare are paid by the municipal community where the service user (patient) is living. However, a patient has to pay a small annual payment for visits to primary care, and a separate payment for each visit to polyclinics and for each hospital day. Visits to community mental health centres are free of charge. The present study deals with costs of public care: costs paid by the patients are not included.

Somatic care costs comprise visits to primary care, to somatic polyclinics in general hospital and general hospital days on somatic wards. Psychiatric care costs comprise visits to psychiatric polyclinics in general hospitals, general hospital days on psychiatric wards and mental hospital days. Costs of outpatient visits and hospital days were summed separately for each participant as somatic costs (SomCosts) and psychiatric costs (PsyCost) and finally, all costs were aggregated together (TotCosts).

Statistical methods

Sums of annual costs of care, from 2005 to 2010, were calculated separately for all care categories (SomCosts, PsyCosts and TotCosts). Means (SD) and medians of various cost categories were calculated and median differences were tested by Mann Whitney U or Kruskal-Wallis tests (Table 2). Differences between dependent distributions were tested by Wilcoxon Signed Rank test. Costs of care were correlated (Spearman correlation) with perceived health and DEPS. Two-tailed $p<0.05$ was considered statistically significant.

Statistical analysis of healthcare cost data involves a number of difficulties. The data are non-negative, often positively skewed and heavy-tailed and include a large number of zeros for non-users [7]. Because of the large number of zeros, the typical count data models with Poisson and negative binomial distributions may not be appropriate: modified models, zero-inflated or the hurdle model, are needed [8]. These models analyse both the extensive and the intensive aspects of individual healthcare consumption separately.

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Zero-inflated models allow the zeros to emerge from the binary choice of participation and also from the counting process following the choice of participation [9]. For example, a patient first chooses whether to visit a doctor or not (extensive aspect). If the patient decides to visit the doctor, the amount of treatment and costs (intensive aspect) is jointly determined by the physician and the patient's compliance with treatment. Thus, zeros may also arise from the counting process in addition to the participation decision. The two-part analysis can be alternatively interpreted as modelling separately the "at-risk" and "not at-risk" subgroups [10].

We used zero-inflated models for analysing determinants of healthcare use. The fit statistics, Akaike's Information Criteria [11] and Vuong test [12], for the models with and without the zero-inflation showed that the zero-inflated negative binomial (ZINB) model provided the best fit when a full set of covariates was used in both "at-risk" and "not at-risk" parts (Table 4). The ZINB regression models were used to test which patient characteristics were associated with subsequent costs of care in the study population. These models have recently been used in various medical studies [10,13,14], and in one cost study regarding gastrointestinal disorders [15].

Estimation of the ZINB regression model produces two-part statistics with different interpretations of coefficients. In the negative binomial part, incidence rate ratios (IRRs) estimate the effect for a one unit change in the explanatory variable relative to the reference group within the "at-risk group" [10]. In the zero-inflated part, odds ratios (ORs) estimate a one unit change in the explanatory variable relative to the reference within the "not at-risk group". These IRR and OR coefficients do not correspond with the whole sample population but separately with the "at-risk" and "not-at-risk" populations, respectively. In practice, the IRR coefficient in the negative binomial part indicates how much each predictor increases/decreases costs of care among the patients who have used the service in question, while OR in the zero-inflated part refers to the probability (risk) of not using the service at all. The bivariate analyses were done with Statistical Programme for the Social Sciences (SPSS) v22.0 and multivariate modelling with statistical software Stata version 13. We computed heteroscedasticity-robust standard errors, which are often suggested in the presence of excess zeros and over-dispersion [8]. P-values <0.05 (with Bonferroni correction) were regarded as significant.

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Results

Bivariate analyses

Two-thirds of the PrC were women, more than half were married, two-fifths were employed and more than two-fifths were retired. Their mean age was 54 years, and on average they had received schooling for 11 years. About 17% of the PrC patients smoked (daily) and another 17% used alcohol regularly. A great majority exercised weekly and had more than two social contacts (Table 1).

Table 1. Background characteristics, health behaviour, social contacts (%), depressive symptoms and perceived health.	
All	**N=495**
Gender	
Men	32.3
Women	67.7
Age	
16-24	8.7
25-44	19.8
45-64	36.6
65+	34.9
mean/SD	54.3/17.3
Marital status	
Single	11.5
Married/Cohabiting	68.1
Divorced/Separated	11.5
Widowed	8.9
Work status	
Working	42.6
Unemployed	10.9
Retired	46.5
Years of education	
6-8	26.7
9-11	30.1
12-14	27.1
15+	16.2
mean/SD	11.3/3.3
Regular use of alcohol	17.4
Regular smoking	16.8
Regular physical exercise	67.3
Social contacts >2	86.3
Depressive symptoms (DEPS; 0-30)	
mean/SD	5.7/5.6
Perceived health (1-4)	
mean/SD	2.7/0.7

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Proportions of zero costs (no visit or hospitalization after baseline contact during the follow-up) were as follows: 7.9% for SomCosts, 85.3% for PsyCosts and 5.9% for TotCosts. SomCosts increased, while PsyCosts decreased during five years' follow-up. During five years' follow-up, TotCosts was 8,145 Euros per capita in 2011 prices; the majority of costs (7,103 Euros; 87.2%) were due to SomCosts, and 1,042 Euros (12.8%) due to PsyCosts ($p<0.001$) (Table 2).

Of SomCosts, 66.0% was due to hospital and 34.0% to outpatient care ($p=0.053$). Corresponding figures for PsyCosts were 35.3% for hospital and 64.7% for outpatient care ($p<0.001$).

There were no gender differences in costs of care (Table 2). Age, marital status and work status associated significantly with both SomCosts and PsyCosts, and education years with PsyCosts. Pair comparisons showed that SomCosts in the youngest age group (16-24 years) were lower than in the other age groups ($p<0.001$ for 25-44 years, $p=0.002$ for 45-64 years and $p<0.001$ for 65+ years). Additionally, SomCosts in the oldest age group were significantly ($p=0.001$) higher than in the next younger group. In the youngest age group, TotCosts were lower than in older age groups ($p=0.006$ for 25-44 years, $p=0.027$ for 55-64 years and $p<0.001$ for 65+ years).

For single patients, SomCosts were lower than in other marital status groups ($p=0.003$ for married/cohabiting, $p=0.002$ for divorced/separated and $p=0.003$ for widowed), and their PsyCosts were higher than in married/cohabiting ($p=0.003$) and widowed ($p=0.004$). In divorced/separated, PsyCosts were higher than in married/cohabiting ($p=0.025$) and widowed ($p=0.011$). For subjects who were working, SomCosts were lower than in those who were unemployed ($p<0.001$) or retired ($p=0.001$). For the unemployed, PsyCosts were higher than in those at work ($p=0.001$) or retired ($p<0.001$). In the subjects with the fewest education years (6-8), PsyCosts were lower than in other education groups ($p=0.001$ for 9-11 years, $p<0.001$ for 12-14 years and $p=0.019$ for 15+ years).

Smoking associated with higher PsyCosts, while use of alcohol with lower SomCosts. Physical exercise had no association with costs of care. Poor perceived health correlated with high SomCosts, and depressive symptoms with high PsyCosts.

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Table 2. Mean (SD) and median of costs (Euros) of care in 2005-2010 by background characteristics, health behaviour, social contacts, perceived health and depressive symptoms.

	SomCost	PsyCost	TotCost	PsyCost/TotCost
All (N=495)				
Mean	7103	1042	8145	12.8
SD	12678	5447	13658	
Median	3069	0	3346	
Gender				
Men (N=160)				
Mean	9371	959	10330	9.3
SD	17517	5709	18110	
Median	3261	0	3602	
Women (N=335)				
Mean	6020	1082	7101	15.2
SD	9381	5326	10788	
Median	2997	0	3332	
p#	0.493	0.701	0.388	
Age				
16-24 (N=43)				
Mean	2066	1404	3470	40.5
SD	2450	5009	5351	
Median	795	0	2025	
25-44 (N=98)				
Mean	6750	2098	8848	23.7
SD	13723	7687	15908	
Median	3147	0	3189	
45-64 (N=181)				
Mean	6564	1004	7568	13.3
SD	12684	5286	13535	
Median	2468	0	2969	
65+ (N=173)				
Mean	9118	394	9512	4.1
SD	13221	3929	13651	
Median	4636	0	4793	
p##	<0.001	<0.001	0.001	
Marital status				
Single (N=57)				
Mean	3977	3128	7105	44.0
SD	6917	9891	11966	
Median	1138	0	2288	
Married/Cohabiting (N=337)				
Mean	7166	466	7632	6.1
SD	13340	2636	13635	
Median	3192	0	3341	
Divorced/Separated (N=57)				
Mean	8751	2278	11029	20.7
SD	14646	8364	16322	
Median	3890	0	4694	
Widowed (N=44)				
Mean	8534	1148	9682	11.9
SD	9784	7594	11828	
Median	4715	0	4843	
p##	0.003	0.001	0.059	

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	SomCost	PsyCost	TotCost	PsyCost/TotCost
Work status				
Working (N=211)				
Mean	4382	857	5238	16.4
SD	7664	3899	8735	
Median	1812	0	2414	
Unemployed (N=54)				
Mean	9867	2597	12464	20.8
SD	20776	8054	21677	
Median	4062	0	5604	
Retired (N=230)				
Mean	8951	847	9798	8.6
SD	13450	5867	14448	
Median	4217	0	4515	
p##	<0.001	<0.001	<0.001	
Years of education				
6-8 (N=132)				
Mean	6952	161	7113	2.3
SD	12158	1091	12186	
Median	3332	0	3499	
9-11 (N=149)				
Mean	6894	1598	8492	18.8
SD	11826	7395	13607	
Median	2969	0	3346	
12-14 (N=134)				
Mean	6668	1642	8310	19.8
SD	11543	6424	13178	
Median	2991	0	3506	
15+ (N=80)				
Mean	8469	455	8924	5.1
SD	16472	2967	16682	
Median	3154	0	3196	
p##	0.935	0.002	0.946	
Smoking				
Regularly (N=83)				
Mean	6565	2694	9259	29.1
SD	13729	10259	17008	
Median	2923	0	3179	
Not regularly (N=412)				
Mean	7211	709	7921	9.0
SD	12471	3742	12891	
Median	3084	0	3510	
p#	0.677	0.001	0.916	
Use of alcohol				
Regularly (N=86)				
Mean	5826	1932	7758	24.9
SD	13193	7957	15061	
Median	2095	0	2706	
Not regularly (N=409)				
Mean	7371	855	8226	10.4
SD	12567	4747	13363	
Median	3312	0	3540	
p#	0.063	0.329	0.330	

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	SomCost	PsyCost	TotCost	PsyCost/TotCost
Physical exercise				
Regularly (N=333)				
Mean	6432	893	7325	12.2
SD	10743	5066	11786	
Median	2894	0	3115	
Not regularly (N=162)				
Mean	8482	1349	9830	13.7
SD	15886	6163	16783	
Median	3834	0	4249	
p#	0.295	0.065	0.126	
Social contacts				
>2 (N=428)				
Mean	7461	900	8361	10.8
SD	13447	5456	14416	
Median	3179	0	3335	
<=2 (N=68)				
Mean	4853	1934	6787	28.5
SD	5423	5344	7198	
Median	2514	0	4185	
p#	0.506	0.001	0.364	
Perceived health (1-5)	0.237***	0.088	0.248***	
Depressive symptoms (0-30)	0.053	0.204***	0.120**	

PsyCost=Cost of psychiatric care
SomCost=Cost of somatic care
TotCost=Cost of psychiatric and somc care
PsyCost/TotCost=Proportion of costs psychiatric care from total costs care

p#=Mann-Whitney U test
p##=Kruskal-Wallis test
*** p<0.001. **p<0.01. * p<0.05

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Multivariate predictive modelling

In zero-inflated negative binomial analyses (Tables 3 and 4), the estimated coefficients should be interpreted in contrast to the reference group: male, 16-24 years-old, single, employed, <9 years of education, non-regular alcohol users, non-smokers, 0-2 social contacts, low number of depressive symptoms and good perceived health.

Poor perceived health and being retired associated with increased likelihood of receiving somatic care. Among service users, age group 25-44, being unemployed and retired, having 9-11 or over 14 years of education, having 3 or more social contacts and poor perceived health associated with higher, while female gender and single marital status with lower SomCosts. Additionally, regular use of alcohol and physical exercise associated (not significantly) with lower SomCosts. Depressive symptoms and being unemployed increased, while old age decreased the likelihood of receiving psychiatric care. Among service users, female gender, age between 25 and 64 years and regular use of alcohol associated with high, while being married/cohabiting or divorced, and unemployed associated with lower PsyCosts (Table 3).

Costs of total care

Poor perceived health and being retired associated with increased, but depressive symptoms (slightly) with decreased likelihood of being a service user (Table 4). Among service users, age groups 25-44, and having poor perceived health associated with higher, while female gender, being single, employed, having low education level, regular user of alcohol and regular physical exercise with lower TotCosts.

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Table 3. Multivariate analyses of costs of somatic and psychiatric care.

	Total costs of somatic care (health index adjustment 2010)							
	Negative binomial part				Zero-inflated part			
	P	IRR	(95% CI)		P	OR	(95% CI)	
Women	0.003	0.659	0.500	0.868	0.472	1.372	0.580	3.244
Age								
25-44	0.003	2.093	1.282	3.417	0.427	0.553	0.128	2.389
45-64	0.165	1.417	0.867	2.316	0.936	1.059	0.265	4.229
65+	0.058	1.744	0.981	3.102	0.822	0.824	0.154	4.416
Marital status								
Married/Cohabi	0.013	1.712	1.122	2.612	0.663	1.359	0.342	5.407
Divorced	0.001	2.548	1.455	4.464	0.546	0.541	0.074	3.971
Widowed	0.019	2.015	1.123	3.616	0.344	2.582	0.361	18.440
Work status								
Retired	0.015	1.586	1.094	2.298	0.005	0.269	0.108	0.670
Unemployed	0.012	1.788	1.138	2.811	0.624	0.717	0.189	2.716
Years of education								
9-11 years	0.035	1.415	1.024	1.956	0.572	1.355	0.473	3.882
12-14 years	0.072	1.404	0.970	2.030	0.802	0.869	0.291	2.597
15+ years	0.020	1.685	1.087	2.613	0.390	1.724	0.498	5.973
Regular use of alcohol	0.019	0.673	0.484	0.937	0.491	0.700	0.253	1.934
Regular smoking	0.299	0.848	0.622	1.157	0.430	0.671	0.249	1.808
Regular excercise	0.052	0.785	0.615	1.002	0.920	0.962	0.455	2.034
Social contacts	0.022	1.440	1.054	1.967	0.341	0.639	0.254	1.607
Depressive symptoms								
Perceived healt	0.033	1.227	1.017	1.481	0.003	0.459	0.275	0.768
Constant	<0.001	983.900	462.400	2093.600	0.981	1.237	0.129	8.157

	Total costs of psychiatric care (health index adjustment 2010)							
	Negative binomial part				Zero-inflated part			
	P	IRR	(95% CI)		P	OR	(95% CI)	
Women	0.015	2.346	1.180	4.666	0.690	0.883	0.478	1.630
Age								
25-44	0.024	5.177	1.238	21.650	0.868	1.092	0.388	3.070
45-64	0.032	2.927	1.094	7.832	0.326	1.739	0.576	5.254
65+	0.088	7.703	0.740	80.230	0.003	9.004	2.109	38.450
Marital status								
Married/Cohabi	0.004	0.201	0.067	0.603	0.998	0.999	0.421	2.369
Divorced	0.015	0.268	0.093	0.775	0.916	0.940	0.300	2.943
Widowed	0.875	1.451	0.014	152.500	0.425	2.292	0.299	17.580
Work status								
Retired	0.985	1.016	0.198	5.221	0.096	0.481	0.203	1.139
Unemployed	0.046	0.470	0.224	0.988	0.001	0.253	0.115	0.559
Years of education								
9-11 years	0.876	1.116	0.280	4.446	0.068	0.396	0.146	1.072
12-14 years	0.163	2.054	0.747	5.654	0.026	0.304	0.106	0.869
15+ years	0.622	0.693	0.161	2.979	0.157	0.426	0.131	1.388
Regular use of alcohol	0.040	3.417	1.057	11.040	0.916	0.964	0.486	1.912
Regular smoking	0.849	1.070	0.534	2.141	0.323	0.689	0.329	1.442
Regular excercise	0.487	0.771	0.370	1.604	0.751	1.105	0.595	2.052
Social contacts	0.998	0.998	0.177	5.631	0.231	1.606	0.740	3.487
Depressive symptoms	0.668	1.020	0.933	1.115	<0.001	0.897	0.848	0.948
Perceived healt								
Constant	<0.001	1719.400	130.100	22727.600	0.001	15.970	3.232	78.900

Note: Table reports incidence rate ratios for the negative binomial part and odds ratios for the zero-inflated part of Zero-inflated negative binomial regression To account for high dispersion of costs, heteroscedasticity-robust standard errors are computed as suggested by Cameron and Trivedi (2005)

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Table 4. Multivariate analyses of total costs of healthcare.

| | All healthcare costs (health index adjustment 2010) | | | | | | |
| | Negative binomial part | | | | Zero-inflated part | | |
	P	IRR	(95% CI)		P	OR	(95% CI)	
Women	0.009	0.679	0.508	0.908	0.909	0.944	0.348	2.559
Age								
25-44	0.016	1.885	1.125	3.159	0.457	0.490	0.075	3.203
45-64	0.444	1.234	0.720	2.115	0.965	0.966	0.212	4.399
65+	0.224	1.455	0.795	2.664	0.793	1.246	0.241	6.435
Marital status								
Married/Cohabi	0.640	1.115	0.707	1.758	0.495	1.886	0.305	11.670
Divorced	0.063	1.736	0.972	3.101	0.886	1.193	0.107	13.340
Widowed	0.211	1.479	0.802	2.729	0.216	4.691	0.406	54.180
Work status								
Retired	0.005	1.697	1.178	2.444	0.001	0.198	0.076	0.514
Unemployed	0.008	1.844	1.170	2.906	0.541	0.585	0.105	3.270
Years of education								
9-11 years	0.003	1.636	1.183	2.264	0.708	1.252	0.385	4.068
12-14 years	0.007	1.677	1.155	2.435	0.646	0.747	0.216	2.589
15+ years	0.019	1.682	1.091	2.595	0.691	1.338	0.318	5.622
Regular use of alcohol	0.39	0.855	0.597	1.223	0.654	0.760	0.230	2.514
Regular smoking	0.829	1.039	0.736	1.466	0.663	0.795	0.283	2.233
Regular excercise	0.058	0.782	0.607	1.009	0.646	1.234	0.504	3.021
Social contacts	0.285	1.197	0.861	1.665	0.467	1.840	0.356	9.507
Depressive symptoms	0.956	0.999	0.974	1.025	0.783	0.988	0.906	1.078
Perceived healt	0.005	1.307	1.082	1.578	0.046	0.540	0.296	0.988
Constant	<0.001	1382.60	629.700	3035.500	0.179	0.185	0.016	2.160

Note: Table reports incidence rate ratios for the negative binomial part and odds ratios for the zero-inflated part of Zero-inflated negative binomial regression
To account for high dispersion of costs, heteroscedasticity-robust standard errors are computed as suggested by Cameron and Trivedi (2005)

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Discussion

Major findings

During six years' follow-up, the total costs of care for the patients attending PrC were about 8,145 Euros per capita in 2011 prices. About 87% of the total costs were due to somatic and about 13% to psychiatric care. A minority (8%) of PrC patients caused no somatic care costs after baseline visit: the reason for their visit was a certificate or a health examination or some other reason. The corresponding figure for psychiatric costs was 85%. During the follow-up, annual costs of somatic care increased, while costs of psychiatric care decreased. Several background factors associated with total costs of somatic and psychiatric care.

Costs of somatic care

Because a great majority of the total costs were caused by somatic care, the predictors of somatic care costs are discussed together with those of the total care costs. It was expected that perceived health would associate with increased care-seeking and with higher costs of total and somatic care. The results suggest that perceived or subjective health is an important predictor for costs of care: more important than diagnostic examinations [16, 17].

There were no gender differences in received somatic or total care but intensity of use of care was lower among women than men. This difference was due to men's higher use of hospital care (not shown). As expected, costs of somatic care increase steeply with age. About two-fifths of costs of somatic care were caused by patients over 64 years of age. Moreover, when the effects of other factors were taken into account, total costs and costs of somatic care were high in young adults (25-44). Possibly, services offered by PrC are suitable for young adults and therefore they use treatment services for a longer time.

Marital status associated consistently with total/somatic care costs: single patients had significantly lower costs than the married/cohabiting. Possibly, close social relationships, spouse and children for the married/cohabiting, and children for the widowed, supported staying in somatic treatment longer. Retired patients were receiving care more often and used care more intensively than others. Unemployed

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patients also made great use of care services. It is probable that, at least to some extent, the high care costs of retired and unemployed patients are partly due to the low registered costs of the working patients. In Finland, there is a separate occupational healthcare system only for the employed, and these costs are not included in the present study. However, it is remarkable that unemployed persons had very high total and somatic care costs. In several studies, unemployment is associated with poor physical and mental health [18,19].

Education had no effect on being a service user, but more than the compulsory education years (>8 years) associated with higher costs of care. Education seems to improve adherence to care generally and somatic care specifically because ill health is generally higher in subjects with minimal education [20]. Low costs of care of patients with minimal education raises the question of whether at least part of their illness remains undetected and/or untreated.

It was unexpected that regular use of alcohol associated with low costs of somatic and total care. In a population study, moderate alcohol drinking did not associate with decreased self-rated health and quality of life [21]. Thus, it is possible that although heavy use of alcohol is associated with increased health problems and costs of care [22], the proportion of such use among regular users is so small that the overall effect is to decrease not increase costs of somatic care. However, in line with a previous study [22], regular use of alcohol was associated with increased costs of psychiatric care. Physical activity is an important health-promoting and cost-reducing factor [23]. In the present study, regular physical exercise also associated (not significantly) with lower costs of somatic care.

Costs of psychiatric care

Mental problems are common in PrC patients [2,24], a majority of them being depressive or other affective problems [3,5] and well treatable in PrC. Yet, in Finland only less than 3% of registered PrC visits involve mental health problems [26].

In the present study, about 15% of PrC patients attended psychiatric care, and nearly 13% of all costs were due to psychiatric care, indicating that PrC is an important path to psychiatric care. As expected, depressed patients were more often referred to psychiatric care. However, among those who attended psychiatric care, depressive symptoms did not increase costs of care, indicating that depressed patients recovered relatively soon and did not need psychiatric treatment more than other patients attending psychiatric care.

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There were no gender differences in being a psychiatric service user, but women used psychiatric care more intensively than men. On the other hand, elderly patients attended psychiatric care less often, but when they did their costs were relatively high (not significantly, because of low numbers of aged/elderly patients). It seems that men need more intensive psychiatric treatment and the aged patients should have been referred to psychiatric care.

Marital status is an important factor in use of psychiatric care. In single patients, psychiatric symptoms and disorders are frequent [26], thus it is understandable that their costs of psychiatric care and their proportion of total costs were exceptionally high. On the other hand, costs of psychiatric care were exceptionally low in married/cohabiting patients, as well as in those with social contacts, indicating that the social support received from intimate relationships is an important buffer against psychiatric problems [27]. Contrary to most studies [28] and although psychiatric problems are frequent in divorced/separated patients [26], they did not use psychiatric care much. It is possible that among divorced/separated patients, although psychiatric disorders/symptoms are frequent [26], their psychiatric problems were treated in PrC (they stayed longer in somatic care) or they completely dropped out of services.

It is understandable that unemployed patients, who frequently suffer from psychiatric symptoms [18,19], often seek psychiatric care. However, the costs of psychiatric care among the unemployed remained lower than average. They probably did not receive the kind of help they expected and therefore dropped out of psychiatric care.

Advantages and Limitations

To our knowledge, this is the first study to use zero-inflated count regression modelling for estimation of costs of somatic and psychiatric care in patients attending primary care. In the negative binomial part, we were able to estimate the relative costs within the service users, and in the zero-inflated part, odds ratios for not using services. The prospective study design is also a clear advantage of the present study.

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The cost data are real costs of visits and hospital days to the service providers. Although the register of costs of care covers the whole population of the healthcare districts, we were not able to estimate the costs of care of the subjects who had moved away from the district, nor the costs of occupational healthcare provided by private services. In 2009, 20% of costs of occupational healthcare was provided by public primary healthcare [29]. The total costs of care for employed people are thus underestimated. Additionally, somatic outpatient care included visits to PrC and to somatic outpatient polyclinics. All PrC visits were regarded as somatic because they could not be separated from PrC visits which were made because of psychiatric problems. However, according to official statistics this proportion is only about 3% [25].

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Does the systematic use of stimulus reduction shorten hospitalization in acute mania? A pilot study

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Abstract

Objective: Bipolar disorder (BD) is a serious mental disorder causing not only suffering and disability, but also substantial economic burden. Costs of hospitalization represent the largest share of direct illness cost. Several clinical guidelines recommend stimulus reduction (SR) during the treatment of patients hospitalized for mania. To date, however, no clinical trials have investigated the efficacy of SR in mania. In this pilot study, we examined the effect of training inpatient staff to use systematic SR on length of stay (LOS) of our patients.

Method: This was a controlled intervention study of adult patients hospitalized due to an acute manic episode (ICD-10 criteria). Treatment as usual (TAU) (N=37) was compared with treatment after systematic training of staff in SR (N=34). LOS was the primary outcome. Young Mania Rating Scale (YMRS), Montgomery-Åsberg Depression Rating Scale (MADRS) and Clinical Global Impression (CGI) at admission and discharge were also measured.

Results: During hospitalization the YMRS, MADRS and CGI improved significantly in both groups, indicating symptom remission during treatment. The LOS in the TAU was 26.9 days (SD 12.2) and in the SR 28.4 days (SD 11.7). No significant differences emerged in LOS or in clinical outcome measures between the groups.

Conclusions: To our knowledge, this is the first study evaluating the use of SR during hospitalization for acute manic episode. Systematic training of staff in SR did not shorten LOS. Effectiveness of SR during hospitalization remains unclear, and further studies are needed to clarify the role of SR in treatment guidelines.

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Does the systematic use of stimulus
reduction shorten hospitalization
in acute mania?

Bipolar disorder (BD) is a serious and long-lasting mood disorder causing considerable suffering and disability (1). Hospital admission is generally required in both acute manic episode and severe depressive episode with suicidal ideation or plans (2). Although BD patients spend a longer time in depression than in mania during the course of their illness (3,4), from an economic standpoint mania appears to be the primary cost driver in BD hospitalizations (2). Therefore, any intervention in manic patients that could reduce the need for hospitalization, or shorten the length of stay (LOS) during inpatient treatment, would have a major effect on diminishing the suffering of patients and costs of hospitalization (5).

When treating mania or hypomania, several treatment guidelines recommend a calm environment and stimulus reduction (SR) (6,7,8). SR includes, for instance, increasing the amount of sleep and limiting activity. To date, however, no studies have investigated the effectiveness of SR in patients hospitalized due to acute manic episode.

The aim of our pilot study was to perform a controlled intervention trial to investigate the effect of training staff in the use of systematic SR (SSR group) in treating hospitalized patients with an acute manic episode, and to compare this with treatment as usual (TAU group) during acute manic episode. We hypothesized that the use of SR in treatment would shorten LOS in the inpatient ward.

Patients and methods

The study was conducted in Aurora Hospital (Helsinki, Finland), which provides secondary psychiatric inpatient care services to all residents of Helsinki (612 664 inhabitants in 2014). This controlled intervention study was carried out in two time periods: August 2013-August 2014 and November 2015-August 2016. Participants comprised patients hospitalized and diagnosed with an acute manic episode (ICD-10). The primary outcome was length of hospitalization.

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Study design

The study was conducted over two time periods during which different patients suffering from acute manic episode were evaluated. First, data from a cohort of patients hospitalized due to an acute episode of mania and receiving TAU was collected from between 27 August 2013 and 27 August 2014. Altogether, 37 patients agreed to participate, 6 patients refused and 19 patients had inadequate data and were excluded. This group (TAU) received standard inpatient treatment consisting of acute-phase pharmacotherapy based on published guidelines, regular assessment by a multidisciplinary team and some elements of SR, although SR was not systematically used.

After data from the first cohort had been collected, one-day training was provided to the staff of the inpatient ward. The training was in the systematic use of SR for the treatment of hospitalized patients suffering from acute manic episode. In addition, a checklist (Appendix) covering the basic elements of the SR treatment was provided. After the training, data from the second cohort was collected of patients hospitalized due to acute episode of mania (SSR-group) between 26 November 2015 and 31 August 2016. During their hospitalization, the SSR group received standard treatment (e.g. use of acute-phase pharmacotherapy) and as an adjunctive treatment, systematic SR. During the daily and weekly ward rounds the use of systematic SR was supervised by the head nurse and chief assistant doctor. Altogether, 34 patients hospitalized due to acute manic episode agreed to participate in the study with systematic SR, 6 patients declined to participate and 9 patients had incomplete data.

At the start of the study in August 2013, there were three wards with 36 beds for patients suffering from affective disorder, but during the study one inpatient ward was closed. The second part of the study comprised two inpatient wards for patients with affective disorder with 24 beds.

All patients provided written informed consent before participation. The study protocol was in accordance with the Helsinki Declaration and was approved by the Ethics Committee of the Helsinki and Uusimaa Hospital District. A research permit was granted by the City of Helsinki, Social Services and Health Care.

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Stimulus reduction in acute manic episode

The psychoeducation manual for BD presents guidelines for the treatment of hypomanic/manic decompensation (7). The authors recommend, for instance, increasing the number of sleeping hours to at least 10. They also recommend limiting daily activities and spending a maximum of 6 hours being active. Physical exercise must be minimized and stimuli reduced: exposure to highly stimulating environments as well as stimulating beverages should be avoided and a relaxing environment (quiet, minimal lighting, few people) provided. The authors also recommend removal of, or restricted access to, credit cards to avoid (over)spending.

Based on these psychoeducation guidelines, the inpatient ward staff were trained in the systematic use of SR by the authors. In addition, a checklist covering the basic elements of the SR treatment was used to ensure adherence.

The systematic SR consisted of ensuring that patients 1) had adequate sleep (8-10 hours) and 2) received acute-phase pharmacotherapy according to evidence-based guidelines. In SR, daily activities and stimuli should be kept to a minimum. We therefore 3) limited the number of visitors (maximum one visitor per day) and 4) restricted night-time use of a phone/computer, and during the day minimal use was recommended (e.g. 15 minutes twice a day). The SR also included 5) restricted use of other stimuli (e.g. pens, papers and books). 6) The possibility of spending brief periods (starting from 15-30 minutes per day) outdoors was carefully evaluated (if it calmed or stimulated the person), and was kept to a minimum in the acute phase. 7) Group activities were not allowed. 8) During hospitalization access to credit cards was denied. 9) A clear agreement between the patient and the inpatient ward staff was reached to ensure the treatment followed the systematic SR routine according to the check-list. 10) The use of SR was supervised daily by the head nurse and weekly during ward rounds by the head nurse and the assistant chief doctor.

Patients and assessments

The inclusion criterion was hospitalization due to acute manic episode. The clinical diagnosis was assigned by a resident or a consultant specialist based on assessment according to the ICD-10 (F30, F31 and F25). Psychometric evaluations were conducted within the first days following hospital admission and included the following scales to assess the intensity of mania and coexisting depression symptoms: Young Mania

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Rating Scale (YMRS) (9), Montgomery-Åsberg Depression Rating Scale (MADRS) (10) and Clinical Global Impression (CGI) (11). The assessments of YMRS, MADRS and CGI were conducted weekly and at discharge by trained psychiatric nurses. LOS collected from medical records served as the primary endpoint. Sociodemographic and illness history data were collected from patients with a self-report questionnaire.

Statistical analysis

Data were analysed using the statistical software SPSS for Windows version 21.0 (SPSS Inc., Chicago, IL, USA). The significance of differences between the TAU group and the SSR group was analysed with the two-tailed independent samples t-test for continuous variables, and Chi-square or Fisher's exact test for categorical variables. The LOS data were normally distributed. Two-tailed P-values <0.05 were considered statistically significant. We were unable to conduct power calculations to estimate sample size because, in the absence of previous studies, it was not known how much the use of systematic SR would potentially shorten inpatient stay.

Results

We analysed and compared two groups hospitalized for acute manic episode during two time periods: the first group receiving treatment as usual (TAU) during the first time period and the second group using systematic SR (SSR) after educational training was provided to staff during the second time period. The demographic and clinical data of both groups are presented in Table 1. During the inpatient stay the YMRS, MADRS and CGI scores of both groups improved significantly, indicating that the symptoms of mania were in remission. Contrary to our hypothesis, training in the systematic use of SR failed to shorten LOS. The average LOS in the TAU group was 26.9 (12.2) days and in the SSR group 28.4 (11.7) days. No significant differences in LOS or clinical outcome scores between these two groups were detected (Table 1).

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Table 1. Demographic and clinical characteristics of the sample.
Values are means (standard deviations) or percentages (YMRS=Young Mania Rating Scale, MADRS=Montgomery-Åsberg Depression Rating Scale, NS=non-significant)

Variable	Treatment as usual (N=37)		Systematic stimulus reduction (N=34)		Significance between groups
Age, years (SD)	43	(13.8)	39	(14.8)	NS
Male gender, N (%)	15	(40.5)	16	(48.5)	NS
Female gender, N (%)	22	(59.5)	17	(51.5)	NS
Living alone, N (%)	15	(44.1)	17	(53.1)	NS
Primary/secondary education only, N (%)	9	(25.7)	8	(25.0)	NS
Bipolar disorder (F31), N (%)	24	(62)	28	(84.8)	NS
First mania (F30), N (%)	10	(27)	2	(6)	NS
Schizoaffective disorder (F25), N (%)	3	(8.1)	3	(9.1)	NS
Previous hospitalizations, N (%)	5.8	(9.0)	8.3	(19.6)	NS
Audit score (SD)	9.8	(8.2)	6.89	(7.81)	NS
Preceding suicide attempts, N (%)	21	(61.8)	19	(59.4)	NS
YMRS score baseline (SD)	21.8	(9.2)	23.1	(7.4)	NS
YMRS score final (SD)	2.8	(3.9)	2.8	(3.2)	NS
MADRS score baseline (SD)	9.6	(6.49)	8.0	(6.1)	NS
MADRS score final (SD)	4.0	(3.6)	3.0	(3.1)	NS
CGI baseline (SD)	5.57	(1.0)	5.3	(0.95)	NS
CGI final (SD)	2.0	(1.0)	1.89	(0.93)	NS
Length of stay (SD)	26.9	(12.2)	28.4	(11.7)	NS

Discussion

To our knowledge, this is the first study to evaluate the effect of SR during inpatient stay of patients suffering from acute manic episode. We compared length of stay (LOS) of manic patients between two time periods. Contrary to our expectations, the systematic training of staff in SR did not shorten LOS compared with treatment as usual (TAU).

Bipolar disorder is associated with a significant psychological burden not only to service users, but also to families and carers (12,13). To maximize the health benefit for people with BD, efficient use of available healthcare resources is required. Bipolar disorder is a disabling illness due to its early onset, chronicity and severity. It is important that resources be directed towards improving the coverage of evidence-based interventions (14), and this underlines the importance of identifying the most efficient treatments.

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Research into chronotherapeutics has yielded promising results. Intriguing initial studies have shown that long dark nights (6 p.m. to 8 a.m.) can stop rapid cycling (15,16) or diminish manic symptoms (17). The discovery of the blue light-sensitive retinal photoreceptor responsible for signalling daytime to the brain suggests that light to the circadian system could be inhibited by using blue-blocking orange-tinted glasses. Blue-blocking (BB) glasses have shown promising results in the treatment of manic episode in one case study (18). The effectiveness of BB glasses in hospitalized patients with bipolar mania was examined in one randomized placebo-controlled trial (RCT). The results imply that BB glasses may be effective and feasible as add-on treatment for bipolar mania (19).

The evidence for efficacy of any non-pharmacological intervention in the treatment of acute mania is scarce. In a study by Dennehy and colleagues (20), the use of acupuncture was investigated in the treatment of hypomania. Almost half of the patients dropped out from the treatment group and the six persons who completed the study showed similar results to the control group. The effect of transcranial magnetic stimulation in mania also failed to show any beneficial effect (21). Psychosocial therapies alone are generally not useful treatments for acute mania (22). Frank and colleagues investigated the use of interpersonal and social rhythm therapy (IPSRT) in combination with pharmacotherapy, and compared this group with clinical management plus pharmacotherapy (22). The IPSRT was not associated with a faster time to recovery from manic episode in this study (23). However, it has been suggested that regularity of social rhythms may have some benefits because of their relation to circadian rhythms (24), but no studies confirm this.

The length of hospital stay in our study was fully in accordance with previous reports. In a study conducted in Spain, the mean LOS in bipolar manic episode was 22.9 (SD 15.5) days (25). In a Swedish study, the average LOS in bipolar disorder was 29.9 days and in mania 29.2 days (2). In our study, the average LOS in TAU was 26.9 (12.2) days and in SSR 28.4 (11.7) days. Manic episodes represented almost half the numbers of bipolar disorder admissions in Sweden (2). When investigating the factors contributing to LOS, mixed episodes (2), poor insight and existence of psychotic features (25) were associated with longer LOS in BD. In acute mania, prior hospitalizations and depressive symptoms at the beginning of the treatment of the acute manic episode increased LOS (26).

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Psychoeducational guidelines recommend the use of SR in treating acute manic episode. We hypothesized that the systematic use of SR would shorten the inpatient stay. Surprisingly, the training of staff in the systematic use of SR failed to shorten LOS. However, the effects of systematic use of SR were not necessarily seen due to the small sample size, also consisting of patients with schizoaffective disorder, and the extremely disabling acute episode. In addition, an important issue to be considered is that the treatment of the TAU and SSR groups might not have been sufficiently different, since some elements of SR were also used in TAU. Moreover, on average the patients had had many previous hospitalizations, leading most likely to longer hospitalizations. In the TAU group, there were many first manias, suggesting shorter hospitalizations (26). However, the difference did not reach statistical significance. One issue to be considered is that possibly the elements of SRR should have focused on stabilizing the circadian rhythm and diminishing the most important stimuli (light) during the period from 6 p.m. to 8 a.m. There is an urgent need for (adjunctive) investigation of all psychosocial elements (e.g. SR, BB glasses) that might lessen the burden of inpatient stay in acute manic episode.

This study has several limitations that warrant discussion. First, the number of patients was limited. In the absence of previous studies, power analyses were difficult to conduct. Post hoc power analyses indicate that the study was adequately powered only for large, over eight-day differences in LOS. However, given no observed differences in estimates, the finding is clearly negative. Second, the patients had been diagnosed clinically and not with a standardized clinical interview. Although all of the patients had an acute manic episode, they suffered not exclusively from BD but also possibly from schizoaffective disorder, and because of the small sample size, we were unable to investigate the LOS in BD and schizoaffective disorder separately. Third, the duration of sleep or motor activity was not measured with actigraphy. In addition, during this study one ward was closed, possibly leading to more patients suffering from acute mania in one ward at the same time during the second time period (SSR group), which may have somewhat influenced our findings. Restricting stimuli in these conditions was difficult. Finally, we were unable to estimate the reduction in LOS after the systematic use of SR, and thus, only post hoc power calculations could be conducted.

The main strength of our study is that, to our knowledge, it is the first study to investigate the systematic use of stimuli reduction in hospitalized patients with acute manic episode. The study is also representative of usual treatment. The patients

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were suffering from an acute severe episode of mania, hospitalized and treated at the ordinary secondary-level psychiatric inpatient setting and the symptoms of acute mania were systematically measured with YMRS.

Conclusions

In this pilot study, we found no evidence that the training of inpatient ward staff in using SR would have shortened LOS in acute mania patients. Given the current treatment guidelines, there is an urgent need for studies investigating the overall efficacy and possible mediating essential components, if any, of SR in inpatient treatment of acute manic episodes of BD patients.

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Conflict of interest

The authors have no commercial associations that might pose a conflict of interest in connection with this manuscript.

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Appendix

Checklist for the reduced stimuli treatment

- the treatment lines are defined by the multidisciplinary team
- the decisions are made at the treatment meetings with the patient
- before the meetings, the multidisciplinary team discusses shortly about the treatment lines
- the treatment lines and decisions are in writing
- the restrictions are made with respect to the patient
- it is vital to ensure enough sleep
- the staff of the ward reacts fast if something unexpected happens
- it is useful that the patient with a manic episode has short discussions with two nurses.
- the patient knows in advance, when is the next discussion.
- the decisions of the multidisciplinary team are respected: the ward staff should have clear unanimous treatment lines
- one should not be provoked

Remember to make an agreement:

- medication - the medication must be used accordingly
- the phone - a clear agreement made: mostly not in use of the patient: clear restriction if needed
- the computer - a clear agreement made: mostly not in use of the patient: clear restriction if needed
- visitors - a clear agreement made: mostly 1 visitor per day
- outings - in the beginning indoor treatment is recommended or short outings with a staff member
- money - make sure the patient is not able to freely use his/her bank account in the ward
- the stimuli can be added gradually
- sometimes it is useful to address all the patients with an acute manic episode on the ward to discuss about the general rules of the ward

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An up to 12-year follow-up of mortality-adjusted diagnostic stability of psychotic depression, schizoaffective disorder and psychosis NOS

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Abstract

Change in the diagnosis is not uncommon among patients suffering from severe psychiatric disorders. Psychotic depression has shown an intermediate stability, whereas the results are conflicting concerning schizoaffective disorder. To have clinically useful predictive power a diagnostic description should have satisfactory stability. This follow-up study of psychiatric inpatients treated in Satakunta hospital district aimed to describe the stability of diagnosis in psychotic depression, schizoaffective disorder, depressive subtype and psychosis NOS, and to study factors associated with a change in diagnosis. Out of the 181 subjects in the study, 119 (65.7%) had a readmission during a minimum follow-up of eight years. The adjusted incidence of change in diagnosis in psychotic depression was 4.56-fold compared to schizoaffective disorder (p<0.001). Most patients (88.0%) with schizoaffective disorder retained their diagnosis, while more than two-thirds (68.7%) of those with psychotic depression had remained, although not psychotic, within the group of major depressive disorders. A non-affective schizophrenia group psychosis was the most common eventual diagnosis among the patients with a change in diagnosis.

Introduction

When evaluating the validity of a diagnostic category, the stability of diagnosis during the course of illness is one relevant phenomenon to observe. The degree diagnoses are retained from one assessment to another may depend on several factors concerning: 1. the diagnostic process, 2. the differential presentation of symptoms

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throughout the course of illness and 3. the reliability and validity of diagnostic categories. The diagnosis can be based on insufficient or unreliable information and the symptoms may fluctuate or be modified by effects of treatment or other disorders (1). For descriptive diagnoses to be valid and reliable in clinical settings the stability of these diagnoses is an important issue. One must also remember that, especially in naturalistic settings, the stability of diagnosis is influenced by the amount of contacts with healthcare providers (2).

Significant variation has been found in the stability of different diagnostic categories of first-episode psychosis patients. In several studies schizophrenia has shown a high level of stability (1,3-10) and affective psychoses, including psychotic depression, an intermediate stability (1,4-5,9,11-13). As one might expect, undefined psychosis has appeared as a very unstable diagnosis (1). Previously, there have been inconsistent findings regarding the stability of schizoaffective disorder, with some studies showing high stability rates (1,8,14) and others relatively low ones (5,9,11). Furthermore, the existence of schizoaffective disorder has been called into question due to lack of any boundary with schizophrenia (15).

It has been suggested that psychotic depression should be viewed only as a provisional diagnosis, questioning the validity of psychotic depression as a diagnostic entity (12). One factor probably affecting the diagnostic trajectory of psychotic depression is age at illness onset. Young age may predict shift to bipolar disorder (16). At an old age, vascular depression and Alzheimer's disease could manifest first with a clinical picture of psychotic depression. Additionally, psychotic depression has been associated with increased mortality (17) and the diagnosis seems to be more stable in those patients with medical comorbidity (13). Therefore, the possible confounding influence of potentially discriminating mortality on the rates of change in diagnosis must be considered.

The follow-up periods have varied dramatically between different studies ranging from less than 2 years to above 25 years, which may partly explain dissimilarities in the results. Likewise, number of hospitalizations may influence change of diagnosis. If no readmissions take place due to death or other reasons, no change can be found. High number of hospitalizations may also decrease inter-rater reliability if clinicians of varying skills and experience assess the patient during the course of illness (2). The diagnostician may have problems interpreting or detecting valid information. In the early phases of schizophrenia, affective disorders are common (18). First-episodes of psychoses may present with affective symptoms that are no longer present during subsequent episodes, resulting in a clinical diagnosis of schizophrenia.

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The aim of the present study was to: 1. describe the stability of diagnosis in psychotic depression, schizoaffective disorder and undefined psychosis, 2. to investigate the effects of number of readmissions and mortality as confounds to change in diagnosis and 3. to study factors predicting a change in the diagnosis. The Ethics Committee of the Hospital District of Satakunta approved the study. The national registers require special authorization for the right to use their data. The permissions were applied for and granted before retrieving the register data.

Subjects and methods

Study design

All the cases with the diagnoses (diagnosis codes: F32.3, F33.3x, F25.1x, F29) in the focus of this study were extracted from the local hospital register. Only the patients with a first ever inpatient treatment episode between 1996 and 2000 in Satakunta hospital district were included in the study. Patient records of the study subjects were reviewed, completed in 2011, and data on gender, age, educational level, marital status and diagnoses were collected. A review of DSM-IV-TR symptoms of major depression and psychosis described in the patient records (entered by residents/psychiatrists and nurses) was made to study the distribution of specific symptoms in the diagnostic groups under study.

Diagnoses of schizoaffective and psychotic depression were chosen, because: 1. these diagnoses could be easily confused, 2. they would be suitable for comparison regarding diagnostic stability, and that 3. if a change in diagnosis would be evident, there might be a drift towards less affective symptoms, i.e. schizophrenia. Diagnosis of undefined psychosis implies either a diffuse clinical picture or not having enough information for an accurate diagnosis. It was used as a marker of possible instability of a diagnostic category.

Data from national registers (hospital discharge register including all hospitalization due to all illnesses and causes of death) were collected from 1995 and followed until 31.12. 2008. For the follow-up, we collected the date and cause of any hospitalization for all participants who were treated in a hospital between January 1,

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1995 and December 31, 2008. The baseline for hospital register data was 1.1. 1995 to find out if there had been recent inpatient episodes elsewhere than in Satakunta hospital district. None were found. The Hospital Discharge Register (HDR) collects information on all episodes of inpatient care in hospitals (since 1969). The register contains information on the patient's background, hospitalization period, procedures, and the main diagnosis and up to two other diagnoses by ICD code (ICD-9 in 1987 through 1995 and ICD-10 in 1996 through 2007). All hospitals send their data electronically to the National Institute for Health and Welfare in charge of HDR. A 1986 data quality study reported that 99% of hospitalizations relating to mental disorders were registered under the correct ICD chapter and 98% of the main diagnoses had been correctly reported at the three-digit ICD code level (19). The causes of death were obtained from the death certificates issued by the physicians and annually collected by Statistics Finland (20). In the case of suicide, the certificate is based on a forensic autopsy. The data filed in Statistics Finland also comprise information on sex, age, and region where the deceased lived, as well as various other demographic data. The initial diagnoses of the patients came from a local register and follow-up diagnoses from the national register.

Statistical analysis

Cross tables were used to analyse differences in background variables between men and women, between readmitted and non-readmitted patients, and between patients whose diagnoses had changed and those who had no change. Mean values were counted using ANOVA or Kruskal-Wallis test. Poisson regression analysis was used to calculate differences between the diagnostic groups in: 1. incidence of readmissions and 2. incidence of change, i.e. the number times a change in the diagnosis was made, in the diagnosis adjusting for the duration of follow-up, gender, number of readmissions, initial diagnosis, psychiatric symptoms, comorbidity and mortality during the follow-up starting from 1.1. 1995. Data was coded binomial (0 vs. 1).

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Results

Sample characteristics

Altogether, the sample included 181 subjects, 70 men (38.7%) and 111 women (61.3%). The mean age at time of first admission was 58.8 years (SD=18.0). The mean age of patients with schizoaffective disorder was 49.8 (SD=5.97), with psychotic depression 60.1 (SD=3.52) and psychosis NOS 36.5 (SD=6.98) (p<0.001, Kruskal-Wallis). Out of the whole sample, at baseline 17.1% (N=31) had a diagnosis of schizoaffective disorder, 23.8% (N=43) a diagnosis of psychosis NOS and 59.1 % (N=107) a diagnosis of psychotic depression. The clinician had diagnosed a comorbid condition in 16.6 % (N=30) of the cases. Mean number of depressive symptoms was 4.7 (SD=4.7) in schizoaffective disorder, 7.2 (SD=1.5) in psychotic depression and 5.5 (SD=2.3) in psychosis NOS (p<0.001, Kruskal-Wallis). Mean number of psychotic symptoms was 6.0 (SD=3.1) in schizoaffective, 3.5 (SD=3.0) in psychotic depression and 7.0 (SD=3.1) in psychosis NOS (p<0.001, Kruskal-Wallis). Those with psychotic depression were significantly more commonly widowed (40.2 % vs. 9.3-16.7%, p<0.001). Patients with either psychotic depression or schizoaffective disorder were significantly more commonly on pension or disability pension (63.6% and 51.6%, respectively) than patients with psychosis NOS (14.0%) (p<0.001) (Table 1).

Hospitalization and mortality

About two-thirds of the patients (N=119) had at least two treatment episodes. Patients with schizoaffective disorder had an average of 4.03, psychotic depression an average of 3.3 and psychosis NOS an average of 2.86 hospitalizations (p=0.18). None of the background factors, initial diagnoses or symptoms described in the patients' records predicted the risk of readmission. There were no statistically significant differences in the adjusted incidence of readmissions between patients with schizoaffective disorder and psychotic depression, but patients with schizoaffective disorder and psychotic depression had a significantly higher incidence of readmissions than those with a psychosis NOS (1.92-fold and 1.66-fold respectively, p<0.001, Table 2).

During the follow-up, altogether 75 cases (42.0%) had died and 34.7% (N=26) of the deceased had never been readmitted. Among the deceased patients 72% (N=54) had an initial diagnosis of psychotic depression, 20% (N=15) a schizoaffective disorder and

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8% (N=6) psychosis NOS diagnosis (p<0.001). Cardiovascular diseases (CVD) were the most common cause of death and accounted for 48.0% (N=36) of the mortality, but there were no statistically significant differences in mortality due to CVD between the diagnostic categories.

Changes in diagnoses

A change in the diagnosis of a patient from the first episode to the last during 8 to 12 years of follow-up was observed in 34 (28.6%) out of 119 readmitted subjects. Men had significantly more commonly had a change in their diagnosis (40.9%) compared to women (21.3%) (p<0.05). There were no statistically significant differences in mean age of patients, between groups of employment, groups of educational attainment, marital status, or groups of depressive and psychotic symptoms regarding a change in diagnosis. Those with a change in diagnosis had on average more hospitalization episodes compared to those with no change (5.5 vs. 4.2, p<0.05).

The adjusted incidence of change in diagnosis in psychotic depression was 4.56-fold compared to schizoaffective disorder (p<0.001, Table 3). A multivariate analysis of factors predicting a change in diagnosis did not indicate any statistically significant predictors. Patients with schizoaffective disorder had mostly retained their diagnosis (88.0%, N=22), while in psychotic depression the stability was lower, because about two-thirds had retained a diagnosis of the major depressive group (68.7 %, N=46). Only one case with psychosis NOS had retained the diagnosis and the rest of the cases were either not readmitted (N=16) or had switched to a different category (N=26). The most common eventual diagnosis in psychosis NOS was schizophrenia (N=11, 40.7%), and in psychotic depression a schizophrenia group diagnosis other than schizoaffective disorder (N=9, 13.4%). In schizoaffective disorder, two patients ended up with a major mood disorder and one with schizophrenia diagnosis. As for other cases (N=12) with a change in diagnosis, their eventual diagnoses were too heterogeneous to categorize.

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Table 1. Background factors and first-episode diagnoses.					
	Schizo-affective disorder	Psychotic depression	Psychosis NOS	Total	Chi-square p-values
Female	18 (16.2%)	69 (62.2%)	24 (21.6%)	111 (61.3%)	
Male	13 (18.6%)	38 (54.3%)	19 (27.1%)	70 (38.7%)	
Total	31 (33.7%)	107 (59.1%)	43 (23.8%)	181 (100%)	0.565
Age group					
55 < years	21 (67.7%)	36 (33.6%)	38 (88.4%)	95 (52.5%)	
> 55 years	10 (32.3%)	71 (66.4%)	5 (11.6%)	86 (47.5%)	
Total	31 (100%)	107 (100%)	43 (100%)	181 (100%)	<0.001
Employment status					
Employed	10 (32.3%)	23 (21.5%)	16 (37.2%)	49 (27.1%)	
Unemployed	5 (16.1%)	16 (15.0%)	21 (48.8%)	42 (23.2%)	
Disability pension/ Pension	16 (51.6%)	68 (63.6%)	6 (14.0%)	90 (49.7%)	
Total	31 (100%)	107 (100%)	43 (100%)	181 (100%)	<0.001
Marital Status					
No relationship	14 (46.7%)	23 (21.5%)	24 (55.8%)	61 (33.9%)	
Married/ common law marriage	11 (36.7%)	41 (38.3%)	15 (34.9%)	67 (37.2%)	
Widowed/divorced	5 (16.7%)	43 (40.2%)	4 (9.3%)	52 (28.8%)	
Total	30 (100%)	107 (100%)	43 (100%)	180 (100%)	<0.001
Educational attainment					
Basic level	13 (41.9%)	54 (50.9%)	19 (44.2%)	86 (47.8%)	
Vocational education	16 (51.6%)	47 (44.3%)	21 (48.8%)	84 (46.7%)	
College/University	2 (6.5%)	5 (4.7%)	3 (7.0%)	10 (5.5%)	
Total	31 (100%)	106 (100%)	43 (100%)	180 (100%)	0.874
Total	31 (100%)	107 (100%)	43 (100%)		

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Table 2. Incidence of readmissions.			
Category comparison	RR for incidence	95% CI	p-value
Schizoaffective disorder vs. Psychosis NOS	1.92	1.46 - 2.52	<0.001
Psychotic depression vs. Schizoaffective disorder	1.15	0.90 - 1.50	0.268
Psychotic depression vs. Psychosis NOS	1.66	1.27 - 2.17	<0.001

Table 3. Incidence of change in diagnosis.			
Category comparison	RR for incidence	95% CI	p-value
Schizoaffective disorder vs. Psychosis NOS	2.74	1.11 - 6.58	0.024
Psychotic depression vs. Schizoaffective disorder	4.55	1.86 - 11.12	<0.001
Psychotic depression vs. Psychosis NOS	0.60	0.32 - 1.03	0.063

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Discussion

Overview

In this study, we found a higher incidence of change in diagnosis among patients with psychotic depression compared to those with schizoaffective disorder. The patients with psychotic depression were older than patients with other diagnoses and had a higher mortality rate. We also found that the patients who had a change in diagnosis were hospitalized more often, but the readmission rate was not statistically different between psychotic depression and schizoaffective disorder. Background factors, including age at first admission, were not found to predict a change in diagnosis. However, between the index episode and the last hospital episode, men seemed to have a change in diagnosis more often. The distribution of symptoms within the diagnostic groups was in line with expectations giving some support to the validity of conclusions on the diagnosis.

Previous studies

The number of hospitalizations has been observed to associate with diagnostic instability (2), though not in all studies (4). In our study, there were more readmissions in the group of patients whose diagnosis had changed, but the number of readmissions did not predict the change in the multivariate analysis. Age at illness onset did not predict a change in diagnosis, which may partly be explained by a high average age (72% were above 50 years of age in the psychotic depression group). We found that men seemed to have more diagnostic change compared to women. This result conflicts with some previous studies (6,13). The mean age of patients with schizoaffective disorder was high (49.8) considering that this was their first hospitalization. One reason could be that these patients were previously treated in outpatient care with a different diagnosis.

Our finding of a somewhat low diagnostic stability of psychotic depression during follow-up is in line with several previous studies with, however, shorter follow-up than in our study (1,9). Compared to a study with a rather similar follow-up period of ten years, our study showed higher diagnostic consistency (68.7% vs. 45.0%) (12). That study has been criticized due to its very young sample with a high proportion of males (21). Another recent study with a long follow-up also found a low diagnostic stability

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in psychotic depression (11). However, the average age of the patients in this study was also significantly lower. Psychotic depression may be a more stable diagnosis when the onset of the illness is at an older age. Young age of a patient with psychotic depression has been found to associate with conversion to bipolar disorder (16). We did not find a drift towards bipolar disorder. Age at index episode and diagnostic practices may have influenced the scarcity of conversion to bipolar disorder in our sample. Initial diagnoses were set at a time when bipolar disorder was much more commonly missed than today. If the symptom profile during the course of illness had retained psychotic and affective symptoms, the diagnosis that was set previously could have been set during further episodes due to convention rather than due to its validity as a description of the patient's disorder. Moreover, diagnosis of hypomania is difficult and could have been missed during later treatment episodes.

Previous studies with a similar long follow-up as in our study have found conversion to schizophrenia common (4,11). Likewise, we found a drift towards either schizophrenia or schizophrenia group diagnosis. The studies regarding diagnostic stability of schizoaffective disorder have found conflicting results with widely varying stability rates. Our study found schizoaffective disorder to be a stable diagnosis (88.0%) over time. There are similar findings in studies with short follow-up periods (1,8). Yet, during a long follow-up, the diagnostic stability of schizoaffective disorder has been found considerably lower (11). The high average age of patients with schizoaffective disorder at baseline in our study is likely to be one reason for the observed stability.

We cannot rule out that the low rate of diagnostic change in the schizoaffective disorder group could be a result of clinician- and institution-related factors such as diagnostic convention in clinical assessments. However, schizoaffective disorder as defined in ICD-10 seems to have provided the clinicians a reliable description of the patient's condition. Anyhow, there may be less need for the clinician to assess critically and change the diagnosis in naturalistic settings when he/she is already dealing with a schizophrenia spectrum disorder. We cannot, of course, take stock of the validity of the diagnoses in the present study. Our study reflects the use of clinical diagnoses and not as such the true disorders of the patients.

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Strengths and weaknesses

The major strength of our study was that all patients with these diagnoses could be traced from the local register, making the review of all hospital records possible, and that our sample was not biased by drop-outs since the national registers of hospital discharge cover all possible hospitalizations, and causes of death register, likewise, cover all deceased cases during the follow-up. The study also had a long follow-up period from 8 up to 12 years. One weakness of the study is that the diagnoses of the index episode were confirmed through reviewing the patient records instead of structured clinical interviews, and the same limitation applies to follow-up where diagnoses were gathered from national registers. The sample size is a limitation that may have influenced statistical significance of the findings, for instance, in factors predicting readmissions. The mean age of the sample was quite high, but to an extent this may be a result of some patients possibly having had a previous treatment episode outside Satakunta before 1995. The patient records, however, include information on previous episodes, but there may be variability in the reliability of the self-reports.

Conclusions

The diagnosis of schizoaffective disorder has shown variable stability previously, probably partly due to differences in diagnostic systems and partly due to length of follow-up periods. We found schizoaffective disorder a highly stable diagnosis in our study. Psychotic depression showed intermediate diagnostic stability. It is interesting, in the light of discussion on the validity of schizoaffective disorder, that this diagnosis might actually be more reliable. Studies on patients at-risk for psychosis have found that depression often precedes full-blown psychotic states. This, in addition to conversion to bipolar disorder, may explain the lower stability of psychotic depression found in several studies. Future studies with large samples should focus on the role of age, incipient vascular depression and progression to schizophrenia in psychotic depression.

High proportions of diagnostic drift over time in first-episode psychotic patient samples highlight the problems of a clinician assessing a patient's symptoms in a complex situation with varying signal to noise ratios. Diagnoses are set in diverging

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settings with differing skills to interpret and match the findings to the descriptions and definitions of the diagnostic categories. Moreover, diagnoses are indexes of illnesses the patients suffer from and sometimes indexes do not function ideally.

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