

Health care costs and changes in subjective health-related quality of life among Finnish adolescents referred to secondary psychiatric out-patient services: a one-year follow-up study

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Abstract

Background: There has been growing interest in economic evidence regarding treatment of mental disorders.

Objective: The purpose of this one-year follow-up study was to evaluate the secondary health care costs and changes in health-related quality of life (HRQoL) in three common adolescent psychiatric disorder groups. Further, HRQoL of patients was compared to that of population controls.

Methods: Twelve- to fourteen-year-old adolescents with behavioral and emotional disorders ($n = 37$), mood disorders ($n = 35$), and anxiety disorders ($n = 34$), completed the 16D HRQoL questionnaire when they entered the adolescent psychiatric outpatient clinics (baseline) and at follow-up. The direct secondary health care costs were calculated using a clinical patient administration system. Population controls included 373 same-aged pupils from randomly selected 13 comprehensive schools.

Results: The direct secondary health care costs did not differ significantly between the three patient groups. However, in adolescents with mood disorders, this investment generated a significant and clinically important improvement in HRQoL, which was not observed in the other two patient groups.

Conclusions: The costs of health care alone do not necessarily reflect its quality.

Keywords: Adolescents, Adolescent psychiatry, Health-related quality of life, Secondary health care costs

Introduction

Most mental health disorders have an early onset, as approximately half of them emerge by the age of 14 and three-fourths by the age of 24 (1,2). Mental health disorders are the leading cause of disability in individuals under the age of 25 (3) and a mental disorder episode exceeding 6 months in duration in adolescence predicts a mental disorder in young adulthood (4). According to a recent comprehensive analysis based on the WHO World Mental Health survey of 27 countries, the absolute risk of a subsequent lifetime mental disorder was higher among individuals who had experienced their first mental disorder episode before the age of 20 as compared with those who had experienced it later in

life (5). Mental health disorders in adolescents are associated with impaired health and various psychosocial problems, as well as occupational disadvantages (6–15). The pooled relative risk of mortality among people with mental health disorders has been reported to be 2.2 (16). However, according to a study in Finland, adolescents placed in a residential school for severe disruptive behavioral problems had a seven-fold risk of premature adult-age death compared to age-, gender- and place of birth-matched controls with no placement (17).

Mental disorders constitute a substantial economic burden as well. According to a recent systematic review, certain groups of disorders are more costly than others and these rankings are relatively stable

between countries (18). Disorders like schizophrenia and intellectual disabilities were generally associated with higher societal costs compared to neurotic disorders and eating disorders. On the other hand, common mental disorders like depressive and anxiety disorders have been associated with notable total costs because of their high prevalence (19). When it comes to adolescent psychiatry, progress in gathering economic evidence remains low (20).

From a decision-making point of view, evidence that considers both the costs and effects of adolescents' psychiatric treatment is important. There have recently been economic studies based on randomized clinical trials with a study and control group in various adolescent psychiatric disorders, where adolescents' own perceptions of their HRQoL and treatment costs have been measured. The disorders studied include, for example, depression (21,22), self-harm (23), early intervention for psychosis (24), conduct disorder (25,26), anxiety (27–29), ADHD (30), and substance use disorders (31).

However, until now, to the best of our knowledge, there have been no observational follow-up studies in a publicly funded real-life setting measuring HRQoL and costs in the treatment of common adolescent psychiatric disorders.

We have previously reported the effectiveness of municipal adolescent psychiatric secondary care services by measuring HRQoL among 12–14-year-old girls and boys referred to psychiatric outpatient clinics (32). In this study, we analyze in greater detail both the costs and HRQoL effects of treatment in the three most common psychiatric diagnostic categories of these adolescents, namely behavioral and emotional disorders, mood disorders, and anxiety disorders. In addition, we compare the HRQoL of these patient groups with that of a gender- and age-standardized sample from the general population and calculate the costs of treatment over one year.

Subjects and Methods

Setting

The data were collected in the Hospital District of Helsinki and Uusimaa (HUS), which is the largest hospital district and the biggest health care provider in Finland. HUS offers municipal secondary and tertiary health care services for approximately 1.5 million inhabitants of Southern Finland, nearly 100 000 of whom are 13–17 years old. This study was conducted in one of the five hospital areas of HUS, the Helsinki University Hospital (HUH), which has altogether 11 psychiatric outpatient clinics for adolescents. Referrals to care typically come from primary health care services, including school health care, social services, and health centers, as well as from private physicians. Municipal adolescent

psychiatric outpatient multidisciplinary teams, each including an adolescent psychiatrist, a psychologist, a psychiatric nurse, an occupational therapist, and a social worker, provide standard routine care according to their clinical judgment. The care consists of psychoeducation, psychotherapeutic and psychopharmacological interventions, parents' appointments, and networking with schools and child welfare services. Inpatient care is available to support outpatient treatment when needed (32).

Patients

Patients were adolescents aged 12–14 years who were referred to 10 of the above-mentioned 11 adolescent psychiatric outpatient clinics between April 2008 and December 2009. The baseline questionnaire was sent to 645 adolescents, 240 (158 girls and 82 boys, 37.2%) of whom filled it in and returned it. Four questionnaires were excluded because the person never visited the outpatient clinic (32).

Procedure

The invitation to the study was sent by mail. First, the information about the study project, the baseline questionnaire, an informed assent form to the adolescent, and an informed consent form to his/her parent or legal guardian were mailed as soon as an adolescent's referral for adolescent psychiatric treatment had been received and accepted. Those referred to crisis intervention were excluded and were referred by a consultant doctor directly to treatment without being placed on a waiting list. Second, a 12-month follow-up questionnaire was sent to adolescents who had returned both their own informed assent and their parents' or legal guardians' informed consent and had completed the baseline questionnaire. One reminder was sent if there was no response to the first invitation or to the follow-up questionnaire (32).

Measurement of HRQoL

HRQoL was measured by the 16D, which is a generic, standardized, and preference-based HRQoL instrument for adolescents aged 12–15 (33). The self-administered 16D questionnaire consists of 16 questions each representing one dimension of health (vitality, seeing, breathing, distress, hearing, sleeping, eating, discomfort and symptoms, speech, physical appearance, school and hobbies, moving, friends, mental function, excretion, depression) (34). For each dimension, the respondent is advised to choose one of the five levels that best describes his/her state of health at the moment (34). The single index score (16D score), representing the overall HRQoL on a 0–1 scale (1=full health, 0=being dead), and the dimension level values, reflecting the goodness of the levels relative to no problems on the dimension (=1)

and to being dead (=0), are calculated from the health state descriptive system (questionnaire) using a set of population-based preference or utility weights. Mean dimension level values are used to draw 16D profiles for groups (33). Due to the broad similarity of the 16D to the 15D adult version, it is assumed that the minimum clinically important change or difference in the 16D score is the same as that established for the 15D score, i.e., ± 0.015 (35).

Psychiatric diagnoses

Data on primary clinical psychiatric diagnoses were collected from the Ecomed® clinical patient administration system (Datawell Ltd., Espoo, Finland) used in the hospital. Of the up to five diagnoses that can be recorded in the system, the first one was deemed to provide the most important reason for the treatment and was thus regarded as the primary diagnosis. The primary clinical psychiatric diagnosis of each patient, based on ICD-10 (36), was made in the adolescent psychiatric unit. If the diagnosis had changed during the 12-month follow-up, the last diagnosis was recorded. The diagnoses were aggregated into the diagnostic categories according to ICD-10. The three most common psychiatric diagnostic categories were behavioral and emotional disorders with onset usually occurring in childhood or adolescence (F90-98) ($n = 76$, 32.2%), mood disorders (F30-39) ($n = 63$, 26.7%), and neurotic, stress-related, and somatoform disorders (F40-48) ($n = 47$, 19.9%).

Treatment costs

Data on patient-level service use, as well as their associated direct secondary health care costs, were collected from the Ecomed® clinical patient administration system (Datawell Ltd., Espoo, Finland) used in the hospital. The perspective taken for the cost analysis was that of the provider of secondary health care. In this study, we were interested in the direct costs of all treatment interventions provided by the HUS during a 12-month follow-up starting from the first visit to the adolescent outpatient clinic. Among the 645 adolescents who were invited to participate, altogether 606 adolescents paid at least one visit to the adolescent outpatient clinic. Unit costs gathered were for the financial years 2008-2011. The costs were inflated to the price level of the end of year 2021 by using the Finnish price index of public health care (<http://www.stat.fi/til/jmhi/tau.html>).

Background variables

The age and gender of the patients were recorded from the referral form.

Population controls

Population controls included 373 (210 girls and 163 boys) same-aged students from randomly selected 13 comprehensive schools in Helsinki in 2013, focusing on grades 6 to 9 (aged 12 to 15 years). The first author (A.R.) assigned randomly a running number for each school in Helsinki, separately for primary schools and for junior high schools. She then contacted the school headmasters in order of the numbers and asked research permission from them. Informed consent from parents and informed assent from pupils themselves were obtained. In case the guardians were divorced, informed consent was obtained from both parents. Altogether 1635 pupils were invited to participate. First, guardians of the pupils received an information letter about the study by mail. Second, the first author (A.R.), attended a class meeting with those adolescents whose parents had given written informed consent and provided information about the study project. Of controls who had their parents' permission, 373 (74.5%, 210 girls and 163 boys) completed the 16D questionnaire.

Ethics

The protocol for this study was approved by the Institutional Ethics Committee of the Helsinki and Uusimaa Hospital District on January 17, 2008 (registration number 538/E0/02). The trial was registered in the HUS Clinical Trials Register (37) with the unique trial identifier 75370.

Statistical analyses

The data were analyzed using the SPSS for Windows statistical software, version 27.0 (SPSS, Inc., Chicago, IL, USA). Comparisons between adolescents who were invited to participate in the study and had paid the first visit to the adolescent outpatient unit and those who only answered at baseline as well as adolescents who only answered at baseline and those who also returned the 12-month follow-up questionnaire were performed using Student's independent samples t-test or Mann-Whitney U-test, where appropriate. Comparisons between patients and controls were performed using Student's independent samples t-test. The distributions of the cost variables were skewed. Consequently, the natural logarithmic transformation of these data was used in the analyses. Comparisons of cost differences between the three disorder groups were carried out with One-Way Anova. When comparing percentage distributions between the groups, the Pearson Chi-Square test or Fisher-Freeman-Halton exact test was used. The statistical significance of the differences in the mean dimension level values (the 16D profiles) between patients and controls adjusted for gender was tested with Covariance analysis, and between baseline and 12-month follow-up with Student's

paired samples t-test, respectively. Comparisons between baseline and 6- and 12-month follow-up points were carried out with repeated measures of variance, followed by Bonferroni corrections. The differences between baseline (before treatment) and 6- and 12-month follow-up results (based on means and 95% confidence intervals (CIs)) are reported for the main results. P-values < 0.05 were considered statistically significant.

Results

Comparison of respondents and non-respondents

The mean age of respondents at baseline (n = 236) did not significantly differ from that of non-respondents (n = 370) who were invited to participate and had also paid the first visit to the adolescent outpatient unit (13.8 years [SD 0.6] vs. 13.7 years [SD 0.7], p = 0.168). The group of respondents comprised significantly more girls than the group of non-respondents (66.1% vs. 48.9%, p < 0.001). There were significant differences in direct treatment costs between respondents and non-respondents (median 4112 € [mean 9468 €] vs. 3183 € [6825 €], p = 0.025).

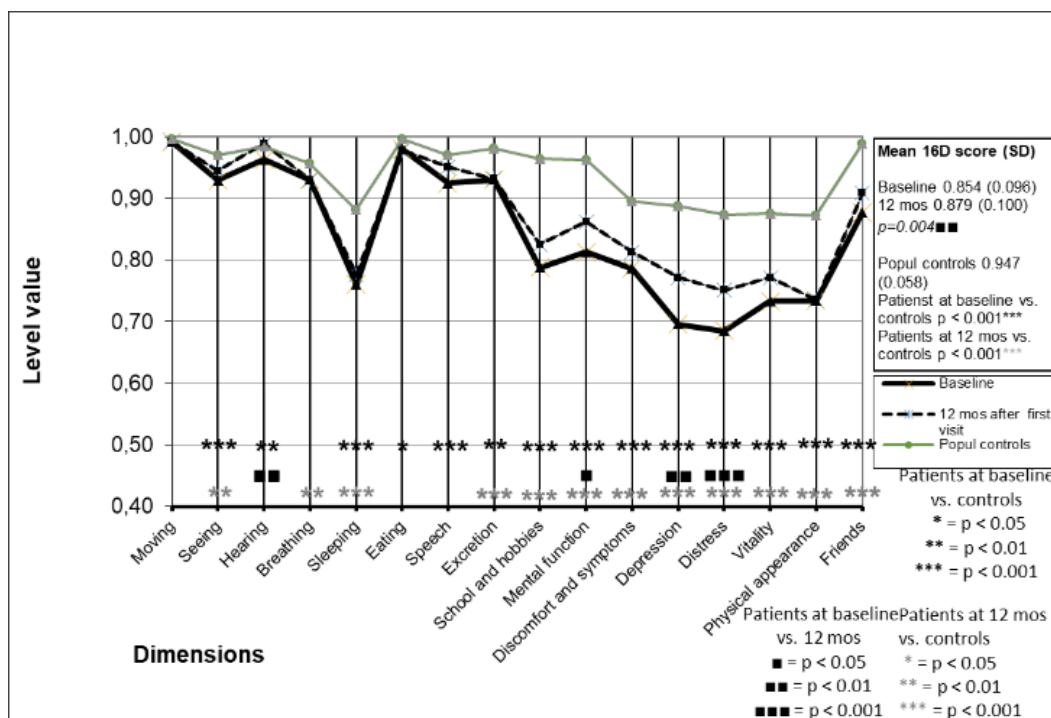
There were no statistically significant differences in the proportion of diagnostic categories between the

baseline respondents and non-respondents (p = 0.277). Of those who answered at baseline, 137 (58.1%) also returned the 12-month follow-up questionnaire. Furthermore, of those who answered the follow-up questionnaire 27.0% (n = 37) were in the group of behavioral and emotional disorders with onset usually occurring in childhood or adolescence (F90-98), 25.5% (n = 35) in the group of mood disorders (F30-39), and 24.8% (n = 34) in the group of neurotic, stress-related, and somatoform disorders (F40-48). The small differences in the proportions of diagnostic categories between the baseline and the 12-month follow-up were not statistically significant (p = 0.793).

No significant differences in gender distribution (p = 0.520) or in direct treatment costs (p = 0.717) were present between respondents at 12-month follow-up and those at baseline.

Comparisons of population controls and patients regarding background variables

Population control subjects (n = 373) were slightly older than patients at baseline (14.2 years [SD 1.0] vs. 13.9 years [SD 0.6], p < 0.001). Further, the population control group comprised significantly fewer girls (56.3% vs. 66.1%, p = 0.016).



Mean 16D score change (95% CI) 0.025 (0.008 to 0.041)
 Estimated mean 16D score difference:
 Patients at baseline vs. controls (95% CI) -0.091 (-0.106 to -0.076)
 Patients at 12 months after first visit vs. controls (95% CI) -0.069 (-0.084 to -0.055)

FIGURE 1. Mean 16D score difference of the patients (n = 137) at baseline and 12 months compared to gender-adjusted controls (n = 373).

Change in HRQoL during the follow-up period and comparisons of population controls and patients

At baseline, patients (n = 137) showed a significantly (p < 0.001) and clinically importantly lower mean 16D score than controls from the community (Figure 1). Focusing on the 16D dimensions, patients were significantly worse off than their peers on 14 of the 16 dimensions (seeing, hearing, sleeping, eating, speech, excretion, school and hobbies, mental function, discomfort and symptoms, depression, distress, vitality, physical appearance, friends).

The mean 16D score of the patients improved statistically significantly (p = 0.004) during the 12-month follow-up. Significantly improved 16D dimensions were mental function, depression, and distress. In the total sample (n = 137), the mean 16D score improved in a clinically important manner among 77 (56.2%) of the adolescents (51 girls and 26 boys). At the 12-month follow-up, patients still showed a significantly (p < 0.001) and clinically importantly lower mean 16D score than population controls. Focusing on 16D dimensions, patients were significantly worse off on all dimensions except moving, hearing, eating, and speech.

Behavioral and emotional disorders

Among adolescents with behavioral and emotional disorders, the median direct cost was 5091 € per year and the mean direct cost per year was 7398 € (Table

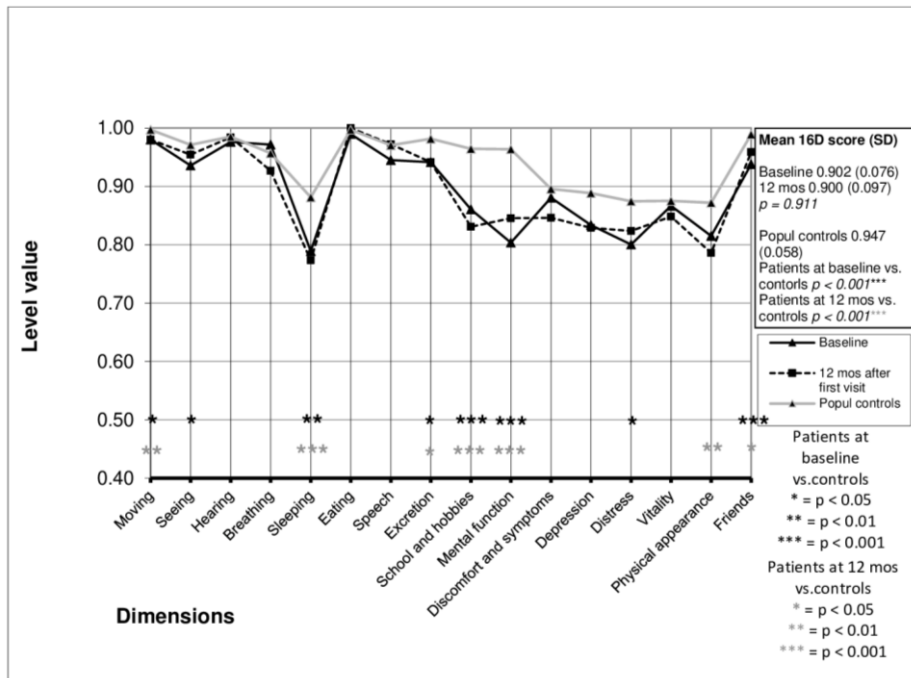
1). The main proportion of direct secondary health care costs originated from psychiatric care, especially outpatient clinic visits. The mean number of adolescent psychiatric outpatient visits per year was 16.7 (SD 16.3). Approximately one-tenth (11.1%) of the total treatment costs came from the treatment of somatic disorders. Compared to the two other diagnostic categories, the proportion of rehabilitation costs (occupational therapy, speech therapy, etc.) was the highest (15.9%) in this patient group.

At baseline, patients with behavioral and emotional disorders showed a significantly (p < 0.001) and clinically importantly lower mean 16D score than controls from the community (Figure 2). Focusing on the 16D dimensions, patients were significantly worse off than their peers on 8 of the 16 dimensions (moving, seeing, sleeping, excretion, school and hobbies, mental function, distress, and friends). The mean 16D score of patients did not improve in a statistically significant (p = 0.911) or clinically important manner during the 12-month follow-up, and patients still showed a significantly (p < 0.001) lower mean 16D score as compared to population controls. Focusing on the 16D dimensions, patients were significantly worse off than their community peers on 7 of the 16 dimensions (moving, sleeping, excretion, school and hobbies, mental function, physical appearance, and friends).

TABLE 1. Direct secondary care treatment costs during the 12-month follow-up in three psychiatric diagnostic categories (from the perspective of the service provider).

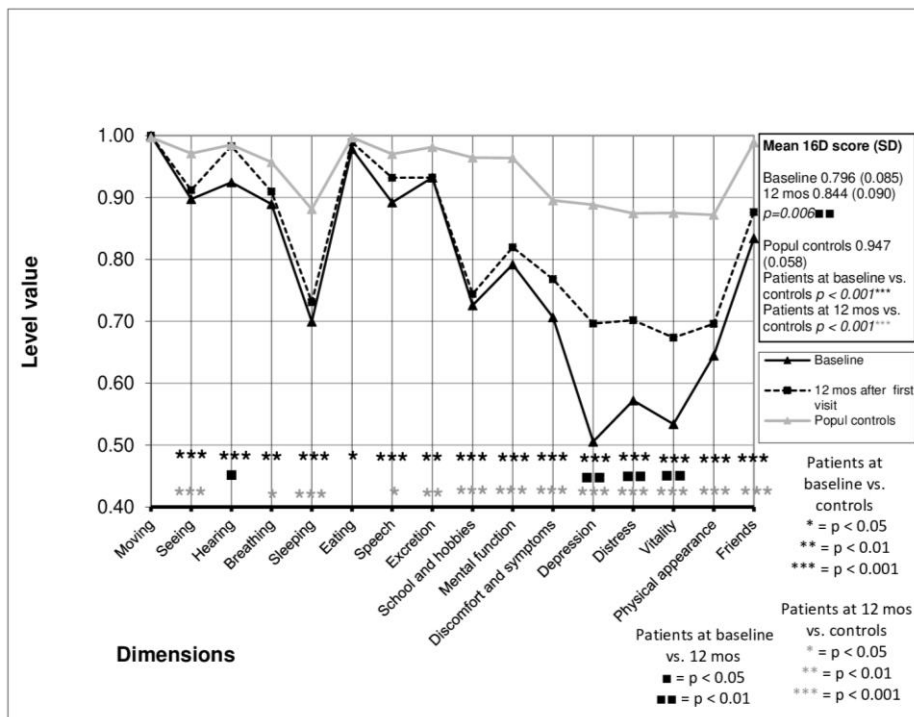
Variable	Behavioural and emotional disorders with onset usually occurring in childhood or adolescence (F90-98) n = 37	Mood disorders (F30-39) n = 35	Neurotic, stress-related, and somatoform disorders (F40-49) n = 34	All (F90-98, F30-39, F40-49) n = 106
Age at baseline, mean (SD)	13.4 (0.61)	13.9 (0.65)	14.0 (0.61)	13.9 (0.66)
Gender, female: n (%)	19 (51.4)	28 (80.0)	26 (76.5)	73 (68.9)
Total cost, 12-month follow-up				
Median total cost, patient € [IQR]	5091 [2177-7413]	6618 [3320-9019]	4955 [1549-7548]	5167 [2229-7993]
Mean total cost per patient € (SD)	7398 (9898)	16194 (27589)	7019 (10770)	10180 (18290)
Costs related to psychiatric treatment out of total treatment costs (%)	88.9	96.1	95.0	94.1
Distribution of costs, unit: mean (SD) [%]				
Outpatient care, visit	15.4 (10.9) [52.5]	24.4 (17.6) [34.7]	19.6 (15.1) [64.8]	19.7 (15.1) [45.9]
Inpatient care, day	0.1 (0.4) [31.5]	0.6 (1.3)[63.7]	0.2 (0.7) [31.4]	0.3 (0.9) [48.4]
Rehabilitation services, visit	2.3 (4.6) [15.9]	0.3 (1.7) [1.5]	0.4 (1.9) [2.6]	1.0 (3.2) [5.4]
Outsourced services, visit	0.1 (0.2) [0.06]	0	0.2 (0.8) [1]	0.1 (0.5) [0.2]
Outsourced secondary health care services, visit	0	0	0.1 (0.5) [0.1]	0.03 (0.3) [0.02]
Interpretation services, visit	0	0.03 (0.2)	0.03 (0.2)	0.02 (0.1) [0.02]
Assistive equipments, visit	0.3 (2.0) [0.01]	0.3 (2.0)	0	0.2 (1.6) [0.03]

SD=Standard deviation, IQR=Interquartile range



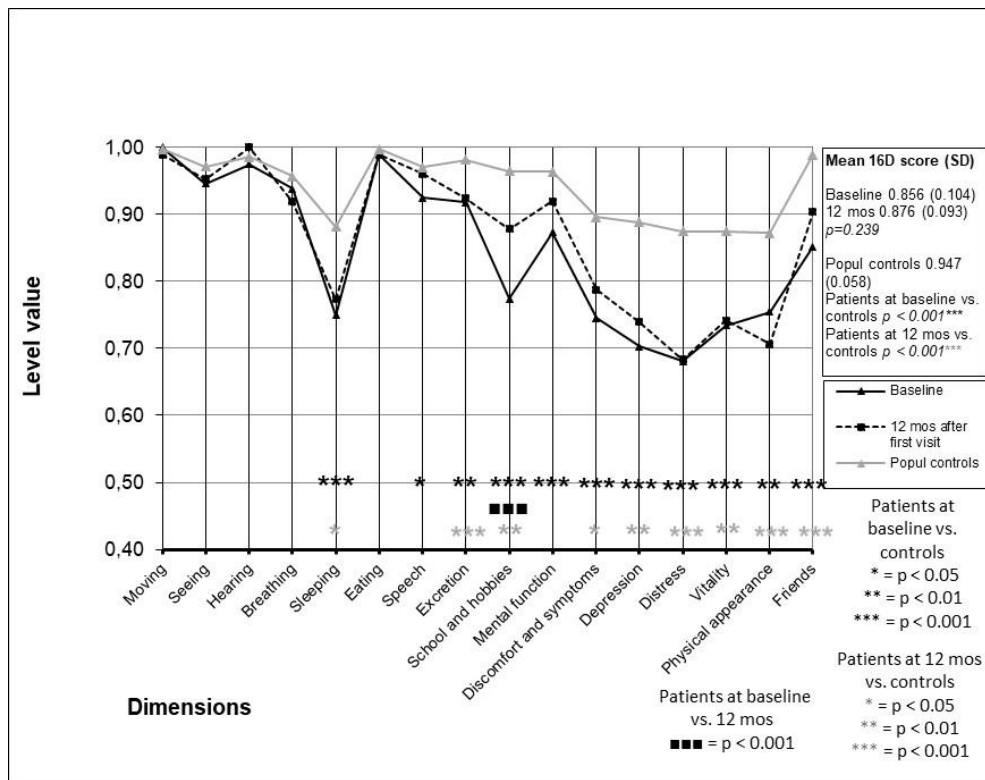
Mean 16D score change (95% CI) -0.002 (-0.031 to 0.028 to), NS
 Estimated mean 16D score difference:
 Patients at baseline vs. controls (95% CI) -0.046 (-0.066 to -0.026)
 Patients at 12 months after first visit vs. controls (95% CI) -0.050 (-0.071 to -0.029)

FIGURE 2. Mean 16D score difference of the patients with Behavioral and emotional disorders with onset usually occurring in childhood and adolescence (n = 37) at baseline and 12 months compared to gender-adjusted controls (n = 373).



Mean 16D score change (95% CI) 0.049 (0.015 to 0.082)
 Estimated mean 16D score difference:
 Patients at baseline vs. controls (95% CI) -0.146 (-0.167 to -0.125)
 Patients at 12 months after first visit vs. controls (95% CI) -0.098 (-0.119 to -0.076)

FIGURE 3. Mean 16D score difference of the patients with Mood disorders (n = 35) at baseline and 12 months compared to gender-adjusted controls (n = 373).



Mean 16D score change (95% CI) 0.020 (-0.014 to 0.055)
 Estimated mean 16D score difference:
 Patients at baseline vs. controls (95% CI) -0.087 (-0.109 to -0.065)
 Patients at 12 months after first visit vs. controls (95% CI) -0.055 (-0.079 to -0.032)

FIGURE 4. Mean 16D score difference of the patients with Neurotic, stress-related, and somatoform disorders (n = 34) at baseline and 12 months compared to gender-adjusted controls (n = 373).

Mood disorders

Among adolescents with mood disorders, the median direct cost was 6618 € per year and the mean direct cost per year was 16 194 € (Table 1). The costs originated mainly from ward care and compared to the other two patient groups, the proportion of in-patient care costs was the highest in this patient group. The mean number of adolescent psychiatric outpatient visits per year was 23.6 (SD 16.8), which was higher than in the other patient groups.

At baseline, patients with mood disorders showed a significantly (p < 0.001) and clinically importantly lower mean 16D score than controls from the community (Figure 3). Focusing on 16D dimensions, patients were significantly worse off on all dimensions except moving.

The mean 16D score, however, improved significantly (p = 0.006) and clinically importantly during the follow-up. Substantially improved 16D dimensions were depression, distress, and vitality. Despite this, patients still showed a significantly (p < 0.001) and clinically importantly lower mean 16D score than population controls at the 12-month follow-up. Focusing on 16D dimensions, patients were significantly worse off on all dimensions except hearing, moving, and eating.

Anxiety disorders

Among adolescents with anxiety disorders, the median direct cost was 4955 € per year and the mean direct cost per year was 7019 € (Table 1). Direct secondary health care treatment costs were mainly caused by outpatient clinic visits. The mean number of adolescent psychiatric outpatient visits per year was 18.6 (SD 14.5).

At baseline, patients presented a significantly (p < 0.001) lower mean 16D score than population controls (Figure 4). Focusing on 16D dimensions, apart from moving, seeing, hearing, breathing, and eating, the patients were significantly worse off on all other dimensions than population controls.

The mean 16D score did not improve significantly (p = 0.239) during the 12-month follow-up, although the dimension of school and hobbies showed a significant improvement. The mean 16D score, however, improved clinically importantly during the follow-up. Compared with controls, patients showed a significantly (p < 0.001) and clinically importantly lower mean 16D score. Focusing on 16D dimensions, apart from moving, seeing, hearing, breathing, eating, speech, and mental function, the patients were significantly worse off on all other dimensions than the population controls.

Comparisons of cost and HRQoL change differences between the three disorder groups during the follow-up

The direct secondary health care costs did not differ significantly between the disorder groups ($F_{2,103} = 2.336$, $p = 0.102$).

By contrast, the mean 16D score change differed significantly between disorder groups ($p = 0.004$). HRQoL improved significantly ($p = 0.002$) among adolescents with mood disorders, the improvement being significant both between baseline and 12-month follow-up (Estimated mean 16D score change 0.049 [95% CI 0.007 to 0.091], $p = 0.019$) and between 6-month follow-up and 12-month follow-up (Estimated mean 16D score change 0.055 [95% CI 0.012 to 0.097], $p = 0.008$). There was no significant change in the mean 16D score among adolescents with behavioral and emotional disorders ($p = 0.206$) or among adolescents with anxiety disorders ($p = 0.577$).

The HRQoL change among adolescents in the disorder groups did not differ between genders ($p = 0.555$). Neither were the 16D score changes during the follow-up related to the number of psychiatric outpatient visits ($p = 0.598$).

Discussion

The aim of this study was to analyze one-year secondary health care costs and changes in HRQoL related to psychiatric treatment among adolescent patients and to compare costs and changes in HRQoL in behavioral and emotional disorders, mood disorders, and anxiety disorders.

The direct secondary health care costs of treatment interventions provided by HUS during the 12-month follow-up, starting from the first visit to the adolescent psychiatric outpatient clinic, did not differ between disorder groups. This could be interpreted that the intensity of treatment received did not differ between disorder groups. From the perspective of HRQoL, the adolescent patients' need for treatment was obvious in all three patient groups. However, the only patient group with substantially improved HRQoL along with psychiatric treatment was that with mood disorders (mean change in the 16D score 0.049).

Our finding agrees with earlier reports that there are effective treatment interventions for adolescents with depressive disorders and self-harm (21,23). In Finland, the national current care guideline on depression (including depression in adolescents) (38) was published before the study period, and that on bipolar disorder (39) during the follow-up of our study. The national current care guidelines on conduct disorders and anxiety disorders were published only after this study. Thus, these timing differences may explain our findings, at least partly.

The follow-up time was only one year, and it might be that longer treatment interventions are needed in conduct and anxiety disorders to achieve improvement in HRQoL. However, none of the three patient groups reached an HRQoL level similar to that of controls from the community, which also implies that longer treatment periods are probably needed.

Overall, treatment interventions in adolescent psychiatric services can have extensive effects on patients' mental and somatic health, as well as on their relationships with parents, family, and friends. This often requires secondary health care treatment resources and has an impact on other sectors of society as well (20,40). It has been proposed that adolescent mental health services should be re-oriented in such a way that treatment interventions are offered in primary health care (41). For example, according to a pilot study by Parhiala et al. (42), when Finnish adolescents with mild or moderate depression received a structured mental health intervention in a school setting, only a small proportion of them had to be referred to secondary-level health care services (42). When secondary health care services are needed, they should be evidence-based and cost-effective.

Study strengths and limitations

The HRQoL data were gathered from the adolescents themselves using an instrument that was originally developed for girls and boys aged 12-15 years (33). This questionnaire has good psychometric properties (33), and it enables comparison between the treatment of different disorders, conditions, and clinical specialties (43,44). Further, we had a same-aged control sample of school pupils. Unfortunately, the number of patients in the different patient groups remained relatively small. This was a consequence of a high dropout rate, which is common in follow-up studies among adolescent populations (45,46). As our study sample consisted of 12-14-year-old young adolescents, the findings cannot be fully generalized to older adolescents. Furthermore, the follow-up time was short, and focusing on secondary health care costs without considering the costs originating from other services like school and child welfare services can be regarded as a limitation. As the proportion of males was higher, and the direct treatment costs lower among patients not responding to the study questionnaires, some selection bias cannot be ruled out. Furthermore, the population controls were slightly older and comprised fewer girls compared with patients. Finally, the reported data were collected in the early 2010s and some of the psychosocial interventions used then may have changed since. However, the three main diagnostic

groups of adolescent psychiatric outpatients are the same also in 2020's.

Clinical significance

HRQoL of adolescent patients with mood, conduct, and anxiety disorders was severely impaired. The direct secondary treatment costs did not differ between disorder groups. However, the same investment generated a substantial increase in HRQoL among adolescents with mood disorders, which was not observed in the two other patient groups.

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Conflict of interest

HS is one of the developers of the 16D. The other author(s) declare no potential conflicts of interest with respect to the research, authorship, or publication of this article.

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