Factors behind a remarkable increase in adolescent psychiatric inpatient treatment between 1980 and 2010 – a nationwide register study

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Factors behind a remarkable increase in adolescent psychiatric inpatient treatment between 1980 and 2010 – a nationwide register study

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ABSTRACT

Purpose: This register-based study aimed to evaluate trends in adolescent psychiatric inpatient care using nationwide data from three consecutive decades.

Methods: The study population (N 17,112) comprised all Finnish citizens aged 13–17 receiving their first-ever psychiatric inpatient treatment between 1980 and 2010 in Finland. Information on inpatient care in the psychiatric hospital was obtained from the Hospital Discharge Register and the Care Register for Health Care, which contains data on all patients discharged from all Finnish inpatient psychiatric health services.

Results: Inpatient admissions remained relatively stable until the early 1990s, after which a steady increase was seen, peaking in 2008 and more marked among females than males. In males, there was an increase in inpatient care episodes for externalizing disorder or mood disorder, and in females for mood disorder. Duration of first inpatient care decreased over time, but level of functioning on admission remained stable or even deteriorated. Females, patients first admitted in the 1980s or diagnosed with schizophrenia were more likely to be re-hospitalized during adolescence.

Conclusions: We reported an increase in adolescent psychiatric inpatient care from the latter half of the 1990s up to 2010, which could be explained by societal and policy changes. In particular, as the study period progressed a significant increase was seen in admissions of females and a global reduction of length of stay (LOS) with no concomitant increase in re-hospitalizations.

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Introduction

Adolescence is characterized by rapid changes in physical, cognitive, emotional, and social facets of development. These changes predispose adolescents to mental disorders that increase vastly from childhood to adolescence [1–6]. Mental disorders in adolescence impair educational achievement, employment, and socioeconomic status, and predict increased need for inpatient and social care and greater incapacity for work in later life. [4,6–13]. Thus, mental disorders are a significant health complaint in adolescence.

Finland is a Nordic country with a population of some five million, of whom 6–7% are adolescents (aged 13–17). The Finnish mental health services intended for adolescents first started to develop in specialist level health care in the 1960s. Adolescent psychiatry was acknowledged as a medical speciality in 1979, initially as sub-speciality of psychiatry or child psychiatry. In 1986, the National Administrative Medical Board required that all central hospitals should provide adolescent psychiatric outpatient services. The Mental Health Act of 1991 stated that those under 18 requiring psychiatric inpatient care should be treated separately from adults, which strengthened the development of adolescent psychiatric inpatient care. The law stipulated outpatient services as a priority. Adolescent psychiatry became an independent medical speciality in 1999. In 2001, the first guarantee of treatment under the legislation was enacted for child and adolescent psychiatry, with maximum acceptable waiting times.

In 2001–2002, a national audit of adolescent psychiatric services (‘Nuotta’) found that outpatient services were used by 1.8% of adolescents aged 13–22, while the need was estimated at 4% [14]. Increases in adolescent psychiatric resources were recommended. A subsequent national audit in 2010 (‘Nalle’) reported that the share of adolescents in contact with adolescent psychiatric services had increased by 67%, now comprising 3% of adolescents aged 13–22. Resources in outpatient care had increased by 39% [15]. It was proposed that the latent need suggested by earlier research had changed into overt demand.

Adolescent mental health services in Finland are mainly provided by specialist-level health care comprising adolescent psychiatric outpatient and inpatient services in central hospitals (21 in the country). Since the 2000s local adolescent mental health outpatient services have been developed in primary care, particularly for the treatment of less severe mental health problems [14]. In addition, school and student...
health services and primary health care also cater for mental health-related needs. There has also been an exponential increase in private family care and rehabilitation homes operating under the child welfare legislation from the 1990s that has even been seen to constitute a risk of becoming an alternative system of adolescent psychiatric inpatient care [14].

Adolescent psychiatric services are mainly provided on an outpatient basis, as emphasized in the legislation (Mental Health Act 1116/1990 and Health Care Act 1326/2010). Inpatient services are provided for those with the most serious psychiatric symptoms and significant functional impairments or risk of causing harm to themselves or others [16]. Adolescent psychiatric inpatient admissions increased from the 1990s to the 2000s. At the same time, institutional placements of adolescents under the child welfare legislation increased [17,18]. Kronström et al. reported an increase in the incidence of psychiatric hospitalizations among Finnish adolescents between 2000 and 2010 [19]. This trend has been observed worldwide; psychiatric emergencies and hospitalizations of adolescents have also recently increased in other countries [20,21]. The characteristics of child and adolescent psychiatric inpatients also changed from 2000 to 2010, with an increase in the percentage of girls on adolescent wards associated with an increase in diagnoses that are more prevalent among girls than boys, such as depression, anxiety, and eating disorders. Kronström et al. concluded that this change may reflect both changes in diagnostic or referral practices and also true changes in the distribution of disorders among service users. In addition to these changes, length of stay (LOS) had decreased, possibly due to changes in treatment practices [19].

To summarize, health policy efforts have been made to increase the volume of adolescent psychiatric outpatient care, which has indeed been achieved. However, despite the emphasis on outpatient care and a general trend in psychiatry toward deinstitutionalization [22], adolescent psychiatric inpatient care appears to have increased. The number of psychiatric beds available to adolescents under 18 years rose steadily in the 1990s, notably in the early 2000s, when in two years there was a 27% increase (from 270 beds in 2000 to 342 in 2002) in beds available [14,23]. However, studies on the development of inpatient care have focused on a short-time span and relatively small numbers of participants, or these studies have been based on surveys that have short-time span and relatively small numbers of participants, or these studies have been based on surveys that have short-time span and relatively small numbers of participants [14].

Aims of the study

The aim of this register-based study is to reliably evaluate trends in adolescent psychiatric inpatient care using nationwide data from three different decades. More precisely, we set out to explore:

1. How have the absolute and population-adjusted figures of first-ever adolescent psychiatric admissions changed from the 1980s to 2010?
2. Has the diagnostic distribution, LOS, and level of functioning among patients admitted changed over time in first-ever adolescent psychiatric inpatient admissions?
3. Have there been changes over time in readmission rates?

Methods

Comprehensive and reliable Finnish national registers make it possible to study large patient groups and to link information on different registers on an individual level by using the unique personal identity code assigned to each permanent resident in Finland. For the present register-based study, information on inpatient care in psychiatric hospital was obtained from the Hospital Discharge Register and the Care Register for Health Care. The Patient Discharge Register (used from 1969 to 1993) and its successor, the Care Register for Health Care (from 1994) contain data on all patients discharged from any inpatient care in the Finnish health services. The most essential data content with regard to providers of hospital services, speciality, patients’ personal identity codes, admission, and discharge and diagnoses has remained unchanged in these registers over the years. The study population comprises all Finnish residents who between 1980 and 2010 had their first-ever psychiatric inpatient treatment at ages 13–17 in Finland.

The National Institute for Health and Welfare was asked to identify study population from the Patient Discharge Register and the Care Register for Health Care. To protect individuals’ privacy data was anonymized by Statistics Finland. After the index admission, the subjects were followed up in registers until the end of 2014. Information on subsequent psychiatric inpatient treatment periods was retrieved from the above-mentioned care registers.

To assess the rate of psychiatric inpatient care during adolescence in general population, information on the size of the adolescent (13–17 years) general population in Finland in each year studied was obtained from Statistics Finland’s population structure statistics, which describe Finnish and foreign citizens permanently resident in Finland at the end of the year.

The data contains diagnostic information from three versions of the International Classification of Diseases (ICD). In Finland, ICD-8 was used in the period 1968–1986, ICD-9 in the period 1987–1995, and ICD-10 from 1996. The WHO conversion tables between ICD-8, ICD-9, and ICD-10 were used to convert ICD-8 and ICD-9 diagnoses to ICD-10 diagnoses [28]. The diagnosis entered as the primary diagnosis in the register data was used as the principal reason for admission to inpatient care. For the analysis ICD-10 diagnoses were the main diagnostic groups with the exception of the F90–99 group, which was divided into F90–92 group and F93–99 group as an F90–92 diagnosis indicates more behavioral problems, whereas F93–99 indicates more emotional problems. Otherwise, the most common main diagnostic groups are used with F20–29 representing schizophrenia group disorders, F30–39 mood disorders, and F40–48 anxiety disorders and combined F10–19, F60–69, and F90–92 groups.
presenting externalizing disorders while the remaining F-group, Z-group, and somatic diagnoses as main diagnosis form another diagnostic group.

To assess the global functioning of patients with psychiatric disorders global assessment scale (GAS) value on arrival was obtained from the Care Register for Health Care. The GAS is a rating scale for evaluating the overall functioning of a subject during a specified time period on a continuum from psychological or psychiatric sickness to health. Research has shown it to have good reliability [29]. In Finland, it is mandatory to record GAS values on arrival and at the end of the psychiatric inpatient care period. Values are recorded by physicians according to on the basis of instructions provided by the National Institute for Health and Welfare. These values were available from the beginning of 1996.

**Statistical analysis**

For demographic information cross tabulations with chi-square were used for LOS and GAS value. Mean, median, and standard deviations were calculated with Jonckheere–Terpstra test for ordered alternatives were used to test for a possibly statistically significant trend. Multivariate associations were studied using logistic regression. Odds ratios (95% confidence intervals) for rehospitalization during adolescence are given according to sex, age group, decade of index admission, and diagnostic group. In addition, for those with first inpatient care during 1996–2010 GAS rating on arrival was used with mean value for whole sample as cut-off.

**Results**

The size of the study population was 17,112. Basic demographic information in different decades is presented in Table 1. In the 1980s, there were more males among those admitted, but in subsequent decades females predominated. The share of middle adolescents (aged 15–17) was about twice that of early adolescents (aged 13–14).

As seen in Figure 1, the proportion of adolescent population entering their first psychiatric inpatient care remained relatively stable in the 1980s and early 1990s. Thereafter the proportion of adolescent population first admitted to psychiatric inpatient care began to rise steadily, peaking in 2008. In females, the rise was more marked than in males.

**Diagnostic distribution of first-ever adolescent psychiatric inpatient admissions**

Table 2 presents the distribution of primary diagnoses in first inpatient care across the whole study period. In males externalizing diagnoses (F90–92) formed the most common diagnostic group (20.4%). In females, mood disorders (F30–39) were most common diagnoses (34.7%).

Numbers of adolescents in first-ever psychiatric inpatient care in each year of the study period grouped by primary diagnosis are presented in Figure 2. The number of adolescents with schizophrenia group (F20–29) diagnoses remained fairly stable over time. In males, there was an increase in inpatient care episodes for externalizing disorder or mood disorder diagnoses. In females, there was also an increase in episodes with externalizing disorder diagnoses, but a much more marked increase in episodes with mood disorder diagnoses.

**Length of stay (LOS) and global assessment scale (GAS) scores of patients with psychiatric disorders**

The mean duration of first inpatient care over the whole study period was 43 d (median 18, SD 72). Over time, LOS decreased from 66 d (median 28, SD 111) in 1980–1989 to 46 d (median 19, SD 77) in 1990–1999, 37 d in 2000–2009 (median 16, SD 56), and 33 d (median 16, SD 49) in 2010. LOS and GAS rating on arrival for each year from 1996 to 2010 are presented in Table 3. Mean GAS scores decreased, being lowest in 2010 for males and in 2005 for females. Over time the number of inpatient periods increased and LOS decreased, while at the same time GAS decreased ($p < .001$).

**Need for rehospitalization**

Of the study population, 39.6% were rehospitalized at least once during adolescence (age 13–17). As seen in Table 4, females were rehospitalized more often than males, those with F20–29 group diagnoses as primary diagnosis in first inpatient care more commonly than other diagnostic groups, and those first admitted in earlier decades more often than those first admitted 2000–2009.

In multivariate analysis (Table 5), the odds for being rehospitalized during adolescence were higher for females aged 13–14 at first inpatient care, for those with first inpatient care during the 1980s or having other than externalizing (F10–19, F60–69, and F90–92) diagnoses. Moreover, patients with lower GAS scores at their first admission during the period 1996–2010 presented a further risk for rehospitalization.

**Discussion**

In our comprehensive hospital register data covering all first-time inpatient adolescent psychiatric treatments between 1980 and 2010, we found a robust and steady increase in adolescent psychiatric first-ever inpatient admissions, meaning that an increasing share of adolescents were admitted to psychiatric inpatient care over time. These findings are in line with those of earlier studies, for example from Italy and the United States [20,21]. Associated changes were shorter stays, increasing proportion of females among those admitted, and increasing absolute figures and proportions of diagnoses other than schizophrenia group disorders. While the greatest increases were seen in admissions due to mood disorders in females and due to externalizing and mood disorders in males, the development was more marked among females, resulting in a clear overrepresentation of females in adolescent psychiatric inpatient care. While LOS diminished over time, this did not manifest as increased...
rehospitalizations. GAS ratings on arrival did not improve over time, suggesting that the increase in numbers of admissions was not due to a lower threshold for admission to inpatient care.

The increase in adolescent psychiatric inpatient care began in the latter half of the 1990s. Increasing the resources and use of adolescent psychiatric outpatient care was an explicit policy in the 2000s [14,15], but numbers of inpatient beds were also increased [14,23]. Expanding the services and increasing service use likely have a reciprocal relationship resulting in an upward spiral in both. Such policies have likely been accompanied by an increasing awareness of psychiatric disorders and of the treatment options. This may have resulted in actual but previously unrecognized needs turning into an active demand for services, but it may also be that the perceived need for treatment followed a

| Table 1. Proportion of males and females in early and middle adolescent age groups. |
|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|
|                 | 1980–1989       | 1990–1999       | 2000–2010       | 1980–2010       |                 |                 |
|                 | 13–14 years     | 15–17 years     | 13–14 years     | 15–17 years     | 13–14 years     | 15–17 years     |
|                 | (n 653) (%)     | (n 1935) (%)    | (n 1214) (%)    | (n 2388) (%)    | (n 3529) (%)    | (n 7393) (%)    |
| Male            | 61.3            | 51.7            | 45.1            | 43.8            | 38.1            | 34.3            |
| Female          | 38.7            | 48.3            | 54.9            | 56.2            | 61.9            | 65.7            |
| Table 2. Primary diagnosis in first adolescent psychiatric inpatient care 1980–2010. |
| Males           | (n = 6873) (%)  | Females         | (n = 10,239) (%)|                 |                 |
| F00–09 (organic)| 0.5             | 0.2             | <.001           |
| F10–19 (substance use) | 5.1 | 2.5 |
| F20–29 (schizophrenia group) | 13.9 | 9.6 |
| F30–39 (mood disorders) | 18.7 | 34.7 |
| F40–48 (anxiety disorders) | 18.7 | 18.7 |
| F50–59 (eating disorders) | 0.9 | 7.9 |
| F60–69 (personality disorders) | 3.4 | 1.7 |
| F70–79 (intellectual disability) | 1.0 | 0.6 |
| F80–89 (developmental) | 2.9 | 0.8 |
| F90–92 (conduct disorders) | 20.4 | 11.7 |
| F93–99 (emotional disorders of childhood) | 7.8 | 6.8 |
| Z-codes         | 4.5             | 3.3             |
| Somatic diagnosis | 2.2             | 1.6             |
reconceptualization of adolescents as mentally ill in situations which in earlier decades were interpreted in some other way. It has been suggested that from the 1990s, a shift occurred in social and health policies, from a socio-ecological social approach in earlier decades to a more individual risk and psychopathology-oriented view and a tendency to resolve challenges with adolescents by treating and supporting individuals instead of focusing on an inclusive society [30]. This may have prompted the increase in adolescent psychiatric inpatient treatment as well as the similarly increasing trends in child welfare placements of adolescents [31] and in receiving intensified and special support in school [32].

In light of the present analyses, the origins of possible reconceptualizations may be traced back to the early 1990s, and to the general (better) recognition of female depression and male externalizing behaviors and depression. Epidemiological studies have shown no increasing trend in adolescent severe depression from the 1990s to the present, either internationally or in Finland, although some studies have reported an increased prevalence of self-reported

Table 3. Mean (median; SD) duration (days) of first inpatient care and mean (median; SD) Global Assessment Scale rating on arrival.

| Year | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 |
|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|
| Male |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |
| Duration | 47 (24; 87) | 45 (22; 70) | 52 (17; 95) | 38 (18; 67) | 34 (18; 57) | 34 (14; 59) | 38 (15; 38) | 36 (18; 60) | 34 (14; 64) | 40 (16; 75) | 40 (17; 55) | 37 (19; 48) | 38 (24; 47) | 38 (20; 50) |
| GAS   | 43 (45; 15) | 42 (40; 14) | 43 (41; 12) | 42 (43; 12) | 40 (40; 11) | 42 (42; 12) | 39 (40; 13) | 40 (41; 14) | 39 (40; 14) | 39 (40; 13) | 39 (40; 13) | 39 (40; 13) | 39 (40; 13) | 38 (40; 13) |
| Female|      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |
| Duration | 43 (17; 67) | 53 (16; 93) | 41 (18; 63) | 38 (17; 56) | 37 (16; 61) | 28 (11; 41) | 28 (11; 45) | 32 (14; 54) | 30 (12; 51) | 39 (14; 62) | 38 (15; 59) | 42 (17; 55) | 39 (18; 51) | 42 (19; 60) | 32 (15; 48) |
| GAS   | 38 (40; 13) | 40 (41; 14) | 39 (40; 13) | 39 (40; 13) | 40 (40; 12) | 40 (41; 13) | 38 (38; 14) | 38 (40; 13) | 38 (40; 13) | 38 (40; 13) | 38 (40; 13) | 38 (40; 13) | 38 (40; 13) | 39 (37; 12) | 39 (40; 12) |
There were significant cuts across services, for example in family services, school support and healthcare, all important for the promotion of mental health, and the prevention of disorders [14,15]. In addition to cuts in preventive services, the economic recession may have had far-reaching consequences for those born in the early 1990s and reaching adolescence in the mid-2000s due to family stress [39–42].

The medicalization theory of mental disorders posits that the present findings are explained by an increasing tendency to regard behavior and phenomena which are part of normal adolescent development as psychiatric symptoms. However, our findings on GAS ratings on admission contradict this assumption. Despite increasing numbers of inpatient admissions, GAS ratings remained relatively stable or even fell over time, suggesting greater severity of symptoms. Further, the mean duration of first period of inpatient care remained relatively stable in the 2000s. Medicalizing normal adolescent development should manifest in improved GAS ratings on admission, and patients with milder symptoms would probably have shorter length of inpatient care. Thus, our data does not point toward the medicalization of normative adolescent development. This concurs with the findings of Kronström et al., who noted that the share of adolescent inpatients with the poorest general functioning had increased when comparing inpatient data from 2000 to 2010 [19].

It is also possible that, while adolescents in later cohorts share the same characteristics with earlier generations, the society around them has changed in a way that imposes more demands on them, making coping with those demands harder than before, eventually leading to seeking or being referred to psychiatric treatment [41,43,44].

There have been concerns that shortening LOS in inpatient treatment may lead to poorer prognoses followed by readmissions [45]. However, although LOS decreased over time in the present nationwide data, there was no increase in rehospitalizations during adolescence. This does not suggest any particular risk related to deinstitutionalization. Rehospitalization was predicted by schizophrenia group diagnosis and low GAS rating on admission, i.e. by greater severity of the disorder, as is appropriate. However, it should be noted that while the proportion of rehospitalizations remained the same, as the number of first-time inpatient admissions increased, so also did the absolute number of adolescents rehospitalized. This, however, should not be directly related to the shortening of LOS as in earlier studies. LOS has been found to be associated more with non-clinical factors than with any specific psychiatric diagnosis [26,46].

It remains unexplained why the increases in adolescent psychiatric inpatient admissions since mid-1990s concerned predominantly girls. There is no evidence that depressive disorders, more common among females, would have increased in prevalence in the adolescent population. However, depressive symptoms may be more severe in females, therefore, possibly increasing the need for inpatient care [47].

Externalizing symptoms and disorders, more common among boys, may also trigger child welfare interventions instead of psychiatric interventions. However, the simultaneous increase in adolescent placements under the Child Welfare Act has concerned boys and girls equally [48]. Thus, all in all, female

### Table 4. Proportion of patients rehospitalized during adolescence.

| Sex          | Percentage (%) | p   |
|--------------|----------------|-----|
| Male         | 40.5           | .003|
| Female       | 38.3           |     |

### Table 5. Odd ratios with 95% confidence intervals for rehospitalization during adolescence.

| Sex          | OR (95% CI) | p   |
|--------------|-------------|-----|
| Male         | Reference   | Reference |
| Female       | Reference   | Reference |

| Age          | Reference   | p   |
|--------------|-------------|-----|
| 15–17 years  | 1.1 (1.1–2) | <.001|
| 13–14 years  | 1.8 (1.7–2.0) | <.001|

| Year of index admission | Reference   | p   |
|-------------------------|-------------|-----|
| 2010                    | Reference   | Reference |
| 2000–2009               | 0.9 (0.8–0.9) | .124|
| 1990–1999               | 1.1 (1.0–1.3) | .062|
| 1980–1989               | 1.2 (1.0–1.3) | .027|

| Primary diagnosis at index admission | Reference   | p   |
|-------------------------------------|-------------|-----|
| F10–19, F60–69, F90–92              | Reference   | Reference |
| F20–29                              | 1.9 (1.7–2.2) | <.001|
| F30–39                              | 1.4 (1.3–1.5) | <.001|
| F40–48                              | 1.2 (1.1–1.3) | .001|
| Other                               | 1.2 (1.1–1.3) | <.001|

| LOS on arrival (index admission in 1996–2010) | Reference   | p   |
|-----------------------------------------------|-------------|-----|
| 40–100                                        | Reference   | Reference |
| <40                                           | 1.2 (1.2–1.3) | <.001|

Depressive symptoms [33–35]. Externalizing problems have decreased steadily both internationally and in Finland [36]. Thus, changes in the epidemiology of disorders obviously do not explain the changes in inpatient care. This leads to the conclusion that a reconceptualization of adolescent emotional and behavioral turmoil as psychiatric disorders may have taken place. Toward the early 2000s public discussion was concerned about allegedly increasing psychosocial problems and violent behavior among adolescents [17]. This may have been associated with interpreting externalizing symptoms as deviation from normal adolescent development, classifying them more as psychiatric symptoms than as behavioral problems and providing inpatient care as a solution. At the same time, inadequately resourced outpatient and preventive services may have led to an increased need for psychiatric inpatient care. To address increasing concerns about the right to receive treatment, the Parliament of Finland in the early 2000s repeatedly granted extra budgets to enhance adolescent psychiatric treatment [37].

Another possible answer to the above questions could be societal changes and a decline in preventive services. In the first half of the 1990s, Finland suffered a severe economic recession. This had a drastic impact at every socioeconomic level [38]. There were significant cuts across services, for example in family services, school support and healthcare, all
adolescents have been institutionalized more than male. This observation warrants further research.

**Methodological considerations**

The strength of this study is the large nationwide data over a long study period of three decades, making it possible to reliably observe possible trends in adolescent psychiatric inpatient care. The data suffers from no distorting effect of regional differences in adolescent mental health services. A limitation is that in clinician-supplied data there is risk of misinterpretation of adolescent symptoms and the possibility of diagnostic inaccuracies. However, diagnostic practices have been shown to be reliable in Finnish psychiatric inpatient care [49] and as we analyzed the data on the level of diagnostic main classes, the risk of individual clinician-related bias diminishes. The GAS rating has been found to have moderate to good reliability, depending on training [50]. The study is based on register data, which is mandatorily collected from every inpatient care period with well-established practices, making it decidedly reliable. As we studied both absolute and population-adjusted figures, the effect of possible changes in adolescent population size over time was also excluded. However, with register-based data it is possible to observe only broader trends, while more explicit analysis requires the examination of individual patient records. Therefore, many phenomena related to psychiatric admissions were not evaluated in this study, among them the contextual reasons for hospitalizations, the hereditary tendency of psychiatric diseases, the family problems, adverse childhood experiences (ACEs) in childhood and adolescence, etc., and possible secular changes therein.

**Conclusion**

We reported an increase in adolescent psychiatric inpatient care from the latter half of the 1990s up to 2010. Neither epidemiological findings on adolescent psychiatric morbidity nor medicalization of adolescent development can explain the increase in psychiatric inpatient care. Changes in family, school, and community environments that increase demands for coping may cause adolescents’ need for treatment to increase even if morbidity remains stable. This warrants further research.

It is also possible that the shift from socio-ecological social policies in earlier decades to individual risk and psychopathology-oriented health and social policies from the 1990s has resulted in an increasing tendency to resolve challenges with adolescents by treating individuals instead of focusing on an inclusive society.

Over time, a global reduction of LOS without a concomitant increase in re-hospitalizations was observed. As the shortening of inpatient care episodes has not led to poorer prognoses, healthcare professionals and policy-makers should continue to develop the needed psychiatric inpatient care to be as short as possible by bringing the focus of treatment and rehabilitation closer to the patient’s normal social environment.

The significant increase in admissions and more frequent readmissions among females remains unexplained in the light of current knowledge. Further research, both psychiatric and sociological, seems warranted to shed light on the phenomenon of increasing hospitalization of female adolescents.

**Ethics approval**

The study was duly accepted by the ethics committee of Tampere University Hospital and obtained the appropriate permissions from the National Institute for Health and Welfare.

**Author contributions**

All authors contributed to the study conception, design, and to the interpretation of the findings. Data preparation and analysis were performed by Timo Holttinen and Riittakerttu Kaltiala. The first draft of the manuscript was written by Timo Holttinen and all authors commented on previous versions of the manuscript. All authors read and approved the final manuscript.

All the authors have accepted the submission of the manuscript in its present form to Nordic Journal of Psychiatry and agree to its publication if accepted.

**Disclosure statement**

The authors declare that they have no conflicts of interest.

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Data availability statement

Availability of datasets used and/or analyzed in this study is subject to data permits from the Finnish register authorities. The corresponding author will provide further information at readers’ requests.

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