Scandinavian Journal of Public Health, 1–9

ORIGINAL ARTICLE

Parental drinking, mental health and education, and extent of offspring's healthcare utilisation for anxiety/depression: A HUNT survey and registry study

INGUNN OLEA LUND[1,2], NJÅL ANDERSEN[3,4], MARTE HANDAL[1], HELGA ASK[1], SVETLANA SKURTVEIT[1,5], EIVIND YSTROM[1,6] & JASMINA BURDZOVIC ANDREAS[1,2]

[1]The Norwegian Institute of Public Health, Norway, [2]Department of Psychology, University of Oslo, Norway, [3]Department of Leadership and Organisational Behaviour, BI Norwegian Business School, Norway, [4]Department of International Business, Norwegian University of Science and Technology, Norway, [5]The Norwegian Centre for Addiction Research, University of Oslo, Norway, [6]PROMENTA Research Centre, Department of Psychology, University of Oslo, Norway

Abstract

Aims: Certain risk constellations of parental drinking, mental health and years of education are prospectively associated with offspring's risk for a diagnosis of anxiety/depression, but it remains unknown how they may relate to other aspects of offspring's mental health. We examined whether such risk constellations were also prospectively associated with the extent of offspring's utilisation of healthcare services for anxiety/depression. *Methods:* The sample included 8773 adolescent offspring of 6696 two-parent families who participated in the Nord-Trøndelag Health Study in Norway. The exposures consisted of five parental risk constellations characterised by drinking frequencies and quantities, years of education and mental health previously derived based on the parental self-reports using latent profile analysis. The outcomes were the number of years in contact, and the total number of consultations/visits, with healthcare services for anxiety/depression in adolescents and young adults as recorded in healthcare registries in the period 2008–2014. Associations were examined using zero-inflated negative binomial regression models, accounting for demographics and offspring's early mental health. *Results:* Parental risk constellations were not significantly associated with the extent of offspring's healthcare utilisation for anxiety/depression during the seven-year study period, neither in respect of number of years nor in number of contacts. *Conclusions:* **Offspring of four risky constellations were no more likely to use healthcare services for longer time periods or have more consultations/visits than offspring of the lowest-risk constellation. Parental risk constellations appear more informative for understanding disorder aetiology than for understanding management and treatment of anxiety and depression during adolescence and early adulthood.**

Keywords: *Longitudinal study, parental drinking, parental mental health, alcohol, socio-economic status, anxiety, depression*

Introduction

Anxiety and depression are common mental disorders [1,2] and leading causes of disability globally [3]. These disorders negatively affect the afflicted individuals in multiple ways: how they eat and sleep, their relationships with family and friends, physical health, performance and attrition in school and at work. Given the high prevalence and severe personal and societal consequences of anxiety and depression, understanding both the aetiology and the course of these disorders is informative for prevention and treatment strategies. This implies research focusing not only on the risk of these disorders but also on the associated healthcare needs among those affected.

Correspondence: Ingunn Olea Lund, Department of Mental Disorders, Norwegian Institute of Public Health, PO Box 222 Skøyen, 0213 Oslo, Norway.
E-mails: IngunnOlea.Lund@fhi.no/ingunnolea@gmail.com

Date received 27 July 2021; reviewed 25 December 2021; accepted 6 January 2022

DOI: 10.1177/14034948221076212
journals.sagepub.com/home/sjp
SAGE

Our previous study showed that offspring's exposure to certain constellations of parental risk factors – specifically low education in both parents, elevated drinking in both parents and symptoms of mental-health problems in fathers – was prospectively associated with their increased risk for a diagnosis and/or treatment for anxiety/depression during the study follow-up period [4]. In this paper, we examine whether such associations exist for additional aspects of anxiety/depression in offspring – specifically, the extent of healthcare utilisation for these disorders as manifested in the duration and number of consultations with healthcare services.

The literature on the association between parental risk factors and the duration of offspring's mental-health problems remains scarce and has yielded mixed results. Some studies suggest an association [5,6]; others do not [7–9]. For instance, a study using the Composite International Diagnostic Interview to assess lifetime disorders and their ages of onset retrospectively in a representative sample of adults aged ⩾18 years [6] reported an association between parental education and the duration of anxiety in offspring [6]. Using the same sample, another study showed an association between parental psychopathology and the duration of mood and anxiety disorders in offspring [5]. Other research, such as a retrospective study based on the US National Comorbidity Survey, which includes adolescents and adults, showed that parental psychopathology and substance abuse were associated with the onset of anxiety/depression but did not find an association with the disorder's duration [7]. Similarly, another study found that parental psychopathology was associated with the onset of social phobia among adolescent offspring but not with its duration [8]. In a 20-year follow-up study, adult offspring of depressed parents were shown to be three times more likely to experience depression than offspring of non-depressed parents. However, within offspring with a registered depression, there was no difference between offspring of depressed and non-depressed parents regarding the number and duration of depressive episodes or how much of the time during the follow-up period they were depressed [9].

The above-mentioned studies primarily utilised clinical interviews or a life history approach. They form the basis of the current knowledge of the association between parental risk factors and the duration of anxiety/depression in offspring. We contribute to and extend this knowledge base by utilising a different approach and providing an additional perspective. Specifically, we prospectively combined information from the general population health survey with nationwide health registries that capture all contact that offspring had with primary and specialist health-care for anxiety/depression over the seven-year study period. Healthcare utilisation literature has shown that individuals with severe anxiety and depression tend to utilise healthcare services more frequently, both for healthcare services in general and for mental healthcare services in particular, than those with less severe problems [10,11].

Parental drinking, mental health and socio-economic status (SES) are all associated with an increased risk of mental-health problems in offspring [9,12–15]. Common limitations in previous research include a focus on a single parental risk factor [16], use of cross-sectional study design [7] and examination of clinical-level parental risk factors only [17]. Consequently, past studies failed to detect risk factors that may present below clinical levels or in (accumulated) combinations with one another. Further, many studies only include information on one parent, often provided by offspring [18]. We addressed these shortcomings in three ways. First, we used a sizeable community sample with information from mothers, fathers and offspring. Second, as our substantive exposure, we used constellations of parental risk factors (alcohol-drinking frequencies and amounts, education and mental health of both parents) as they occurred in families [4]. Third, we used a prospective study design that captures outcomes of interest with practically no attrition; offspring were followed up through two *continually* updated health registries, providing information about consultations/visits with primary and specialist healthcare for anxiety/depression.

Aims

We examined the prospective association between parental risk constellations and the extent of offspring's subsequent healthcare utilisation for anxiety/depression – specifically, the number of years in contact with and the number of consultations/visits with healthcare services during the seven-year study period (2008 and 2014) when they were adolescents or young adults. The findings can improve our understanding and offer valuable nuance to the knowledge of whether early exposure to parental risk constellations is associated not only with risk of offspring anxiety/depression but also with the extent of healthcare utilisation for these disorders.

Methods

Design and sample

We combined survey data from the Nord-Trøndelag Health Studies (HUNT/Young-HUNT) with prospectively collected nationwide health registry data

and data from the population registry. The HUNT surveys provided information on substantive exposures and covariates, and health registries provided the substantive outcomes of interest. Data sources were linked at the individual level using personal identification numbers assigned to all Norwegian residents.

HUNT and Young-HUNT are large, longitudinal, general population studies covering a range of health-related topics. All adults >20 years of age and adolescents between 13 and 20 years of age residing in Nord Trøndelag county in Norway were invited to participate, respectively, in these two studies [19–21]. The demographic structure of the county is reasonably representative of the Norwegian population [19–21].

We used data from two waves collected in 1995–1997 and 2006–2008. The survey response rates ranged from 54.1% to 82.7% [19,20]. Detailed information on response rates, how non-participation was handled and reasons for non-participation have been provided in HUNT and Young-HUNT cohort descriptions [19–21]. HUNT surveys provided information on parents, while Young-HUNT provided information on offspring. Parents and offspring completed the HUNT questionnaires at approximately the same time. Their responses were linked at the family level using the unique family numbers available from Statistics Norway. Because we aimed to examine the associations between exposures and outcomes in a sample that was not affected by a range of other risk factors, such as single-parent families, other potential risks were eliminated by study design and through the inclusion criteria focusing on two-parent families only. Therefore, our analytical sample consisted of family triads (N=6696) where all age-eligible offspring (N=8773) and both parents had completed the surveys. All offspring were 13–19 years old when they participated in Young-HUNT and 14–33 years old in 2008 when the seven-year registry-based follow-up started.

Ethics

Parental informed consent for offspring participation, and offspring assent, including permissions for registry linkages, were obtained for all participants by the HUNT/Young-HUNT studies. The study was approved by the Norwegian Data Protection Authority (#38949) and the Regional Committees for Medical and Health Research Ethics (#2014/867). All procedures were performed following the relevant guidelines and regulations of these review boards.

Measures

Exposures. The primary exposure was based on previously identified constellations of maternal and paternal risk factors: education, drinking frequency and amount and mental health [4]. Both parents reported their current alcohol consumption in HUNT surveys. These included drinking frequencies in the previous year ('About how often in the last 12 months did you drink alcohol?'), with response options being 'never drink alcohol', 'not at all in the last year', 'a few times a year' to 'four to seven times a week', and two-week drinking quantities ('How many servings of beer, wine or spirits do you usually drink in the course of two weeks?'), where the participants recorded the actual number of consumed drinks. The frequency responses were recoded to reflect mid-points of the original categories (i.e. four to seven times a week=5.5 times/week), while the quantity responses were summed to obtain the total alcohol intake (i.e. the sum of cans/bottles of beer, glasses of wine and shots of liquor). To aid interpretation, the original estimates were rescaled to show average weekly drinking quantities and frequencies. Parental mental-health symptoms were measured with the Hospital Anxiety and Depression Scale (HADS) [22], where both parents completed the HADS scale as part of the HUNT survey [23]. HADS is commonly used to screen for anxiety and depression, where the summed scale scores translate to the following diagnostic categories: 0–7, normal; 8–10, mild symptoms; 11–14, moderate symptoms; and 15–21, severe symptoms [23]. The number of years of completed education for each parent was obtained from Statistics Norway.

Based on these indicators, we previously identified five mutually exclusive risk constellations [4] using a latent profile analysis [24]. Table I provides a conceptual overview of these latent profiles (LP), together with an overview of the variables (including their original coding and format) used in the original latent profile analysis extraction. In short, LP1 was characterised by low education for both parents but otherwise no risk. Multiple risks characterised LP2: low education, mental-health symptoms within a mild disorder range and weekly binge drinking in both parents. The lowest overall risk characterised LP3: some higher education, good mental health and infrequent low-quantity drinking in both parents. In LP4, casual weekly drinking in both parents was the only potential risk factor. LP5 was characterised by multiple risk factors: frequent and high-quantity drinking in both parents and mental-health symptoms indicative of a mild disorder in fathers.

Covariates. We included the following covariates: age at Young-HUNT participation (baseline), age at first registry follow-up in 2008 and sex. We also included a measure of early mental-health symptoms as self-reported in the Young-HUNT survey by the

Table I. Conceptual description of the parental risk constellations (latent profiles).

	Latent profile 1: low education	Latent profile 2: multiple risks (binge drinking and mental-health symptoms in both parents)	Latent profile 3 (reference): low overall risk	Latent profile 4: casual drinking in both parents	Latent profile 5: multiple risks (frequent drinking in both parents, mental-health symptoms in fathers)
Participants, *n* (%)					
Family[a]	4857 (69.1%)	194 (2.8%)	1444 (20.5%)	473 (6.7%)	61 (0.9%)
Children	5966 (68.0%)	246 (2.8%)	1884 (21.5%)	598 (6.8%)	79 (0.9%)
Education (years)[b]					
Maternal	**<12**	**<12**	>12	>12	>12
Paternal	**<11**	**<12**	>14	>12	>12
Maternal drinking (weekly) [c, d]					
Average quantity	1 drink	**3.92 drinks**	1.25 drinks	**4.1 drinks**	**6.5 drinks**
Average frequency	0.4 days	0.95 days	0.5 days	**2.3 days**	**5.4 days**
Average drinks per drinking occasion		**4.1 drinks/day**		**1.7 drinks/day**	**1.1 drinks/day**
Paternal drinking (weekly)[c,d]					
Average quantity	2 drinks	**11.2 drinks**	2.3 drinks	**4.8 drinks**	**6.6 drinks**
Average frequency	0.7 days	1.9 days	0.9 days	**2 days**	**3 days**
Average drinks per drinking occasion		**5.95 drinks/day**		**2.35 drinks/day**	**2.2 drinks/day**
Mental health (HADS Score)[c,e]					
Maternal	Normal range	**Mild symptoms**	Normal range	Normal range	Normal range
Paternal	Normal range	**Mild symptoms**	Normal range	Normal range	**Mild symptoms**

Conceptual summaries for the parental risk constellations (LP1–LP5) are shown. The corresponding LPA procedures and original LPA estimates (i.e. means and standard error; fit indices, etc.) were reported in Lund et al. [4]. To aid interpretation, we show the estimated weekly and per drinking occasion averages and the meaningful educational cut-offs and disorder severity for HADS average scores. Elevated levels of parental risk factors are shown in bold.

[a]Some families had multiple children. Therefore, the number of children is greater than the number of families for each LP.

[b]Based on records from Statistics Norway, indicating the number of years of completed education for each parent. The risk factor of parental low education is conceptualised as 'high school or less on average', where 12 years of completed education corresponds to high school completion.

[c]Obtained from HUNT parental self-reports.

[d]Past-year drinking frequencies ('About how often in the last 12 months did you drink alcohol?'), with response options being 'never drink alcohol', 'not at all in the last year', 'a few times a year' and '4–7 times a week'), and two-week drinking quantities ('How many servings of beer, wine or spirits do you usually drink in the course of two weeks?'), where the participants recorded the actual number of consumed drinks, were used to derive parental drinking indicators used in the original LPA classification. The frequency responses were recoded to reflect mid-points of the original categories (i.e. 4–7 times/week=5.5 times/week). while the quantity responses were summed to obtain the total alcohol intake (i.e. the sum of cans/bottles of beer, glasses of wine and shots of liquor). To aid interpretation, the original estimates were rescaled here to show the estimated average weekly drinking quantities and frequencies, as well as the average number of drinks consumed per drinking occasion. Parental drinking was conceptualised as risky if it reflected drinking on two or more days per week or consuming four or more alcoholic drinks per drinking occasion/day (i.e. binge drinking). LP1 and LP3 were not considered to be risky drinking patterns because they reflected less than weekly drinking in both parents. Thus, averages per occasion are not shown.

[e]Based on HADS, a commonly used screener for anxiety and depression. Parental impaired mental-health risk followed the established HADS diagnostic categories: 0–7, normal; 8–10, mild; 11–14, moderate; and 15–21, severe symptoms [23].

LPA: latent profile analysis; HADS: Hospital Anxiety and Depression Scale.

participants on the five-item Hopkins Symptoms Checklist (SCL-5) [25]. In line with previous reports, SCL-5 scores were categorised to reflect the top 25% of the distribution versus the rest [4,26]. Missing responses (*N*=138) were retained as a separate category to prevent loss of data.

Outcomes. Information on our substantive outcomes of interest, namely the extent of healthcare utilisation for anxiety and depression over the seven-year study period, were obtained from the Norwegian primary and specialist health registries where all consultations/visits with primary and specialist healthcare services for somatic and psychiatric conditions are recorded at an individual patient level. This study used registry records in the primary and specialist healthcare services that included anxiety/depression codes, recorded annually between 2008 and 2014. Table II gives an overview of the included diagnostic codes from the International Classification of Primary Care and International Statistical Classification of Diseases and Related Health Problems 10th Revision. We examined two related outcomes: (a) the total number of calendar years the offspring were in contact with the healthcare services, and (b) the total number of offspring's consultations/visits with the healthcare services for anxiety/depression during the seven-year study period (2008–2014). Both outcomes were based on the combined primary and specialist healthcare registry records. The health registry data used are of high quality and close to complete for the Norwegian population. The registries capture all consultations/visits with primary and public specialist healthcare services for anxiety and depression. Only about 13% of psychiatric specialist healthcare services are given by private providers [27], which, with few exceptions, are obliged to report to the Norwegian Patient Registry.

Table II. Codes for anxiety and depression, as identified in the primary and specialist healthcare registries.

Registry for primary healthcare[a]		Registry for specialist healthcare[b]	
ICPC codes		ICD-10 codes	
P01	Feeling anxious/nervous/tense	F30–F39	Mood (affective) disorders
P03	Feeling depressed	F40–F48	Anxiety, dissociative, stress-related, somatoform and other non-psychotic mental disorders
P73	Affective psychosis		
P74	Anxiety disorder/anxiety state		
P76	Depressive disorder		
P79	Phobia/compulsive disorder		

[a]Control and Reimbursement to Practitioners in Primary Healthcare for Seeing and Treating 'Patients' Database (CPHR).
[b]The Norwegian Patient Registry (NPR).
ICPC: International Classification of Primary Care; ICD 10: International Statistical Classification of Diseases and Related Health Problems 10th Revision.

Analyses. As the number of years spent in contact with and actual consultations/visits with healthcare services for anxiety and depression are technically counts, and as the majority of our participants were not registered as having utilised healthcare for these problems (i.e. there was an excess of 'zeros' in our data), our primary analysis was a count regression model – specifically, zero-inflated negative binomial (ZINB) regression [28,29]. As zero-inflated models address both zero-inflation and over-dispersion problems, they are well suited and commonly used for mental-health services research where studied outcomes often have low prevalence rates [28–30].

Although ZINB models consist of 'zero-inflated' and 'count' components, only the count components of these models specifically address our substantive questions concerning the extent of healthcare utilisation. For this reason, and in alignment with the healthcare utilisation literature [29,30], we report only the rate estimates (i.e. incidence rate ratios) obtained from the count component of the estimated ZINB models.

One ZINB model was estimated for each of the studied outcomes – specifically, for the number of years offspring spent in contact with healthcare services (model 1) and for the total number of offspring's consultations/visits with healthcare services (model 2) for anxiety/depression during the study period. Identical sets of predictors (i.e. offspring sex, age at Young-HUNT participation, age at first registry follow-up in 2008, mental health at HUNT participation and parental risk constellations) were included in the zero-inflated and the count component in ZINB models for both outcomes. The key exposure (i.e. parental risk constellations) was modelled as a categorical variable, with the low-risk group, LP3, as the reference.

All analyses were conducted in Stata v.15 using the *-zinb* command, where robust standard errors were estimated based on family-level clusters using the *vce* (cluster) option. All estimates were thus adjusted for within-family nesting.

Results

Most participants (81.5%) did not have any record for anxiety or depression during the study follow-up period of 2008–2014 (Table III). Because of such preponderance of no utilisation (i.e. zeros), the average number of healthcare utilisation years for these disorders in the entire sample was just under half a year (*M*=0.43, *SD*=1.15). The average was four consultations/visits (*M*=3.7, *SD*=17.0) during the seven-year study period. For those 18.5% who had at least one instance of healthcare utilisation, the average number of utilisation years was 2.34 (*SD*=1.65; min=1, max=7), and the average number of consultations/visits was 19.95 (*SD*=35.16; min=1, max=478) during the seven-year study period. Table III shows the distribution of main outcomes across the risk profiles, both for the entire sample and for the subsample of those participants who utilised the healthcare system. As evident from these summaries, our data were highly over-dispersed and, as such, appropriately analysed via ZINB models [28–30].

Table IV shows the results from the two fully adjusted ZINB regression models, with the number of healthcare utilisation years (Model 1) and the number of consultations/visits with healthcare services (Model 2) for anxiety and/or depression in offspring during the seven-year study period as the examined outcomes. As evident from the results, parental risk constellations were not significantly associated with the count components in either of the models; that is, offspring of the four relative higher-risk parental constellations did not spend more years utilising healthcare for anxiety and depression, nor did they have more consultations/visits for these issues during the seven-year follow up than did offspring from LP3 units, the lowest-risk constellation.

The most salient risk factor, for both the number of utilisation years and the number of consultations/visits with healthcare services for anxiety/depression, was the offspring's clinically elevated mental-health symptomatology as self-reported during Young-HUNT

Table III. Descriptive summaries for primary outcomes across the latent profiles (LP) of parental risk constellations.

	Number of years in contact with healthcare services for anxiety/depression (2008–2014)			Number of consultations/visits with healthcare services for anxiety/depression (2008–2014)		
	Proportion of participants without any healthcare services utilisation, *n* (%)	Number of years in contact with healthcare services, *M* (*SD*)	Number of years in contact with healthcare services among those who utilised it, *M* (*SD*)	Proportion of participants without any healthcare services utilisation, *n* (%)	Number of healthcare consultations/ visitations, *M* (*SD*)	Number of healthcare consultations/ visits among those who utilised it, *M* (*SD*)
Entire sample *N*=8773	7149 (81.5%)	0.43 (1.15)	2.35 (1.6)	7149 (81.5%)	3.7 (17.0)	19.96 (35.16)
LP1 *N*=5966	4813 (80.7%)	0.45 (1.2)	2.31 (1.6)	4813 (80.7%)	3.68 (16.7)	19.0 (33.9)
LP2 *N*=246	198 (80.5%)	0.46 (1.2)	2.38 (1.6)	198 (80.5%)	3.17 (11.4)	16.3 (21.5)
LP3 (reference) *N*=1884	1561 (82.9%)	0.41 (1.2)	2.41 (1.7)	1561 (82.9%)	3.88 (18.4)	22.68 (39.4)
LP4 *N*=598	514 (85.9%)	0.37 (1.1)	2.68 (1.8)	514 (85.9%)	3.54 (17.9)	25.2 (41.7)
LP5 *N*=79	63 (79.7%)	0.43 (1.0)	2.13 (1.2)	63 (79.7%)	2.73 (10.0)	13.5 (19.1)

The proportions of offspring who did not have any healthcare services utilisation for anxiety/depression during the study period and the average number of years in contact with and the average number of actual consultations/visits for the subsample of offspring who did utilise healthcare services for those problems during the 2008–2014 study period are shown. All estimates adjusted for within-family clustering only.

Table IV. Healthcare utilisation for anxiety/depression in offspring (2008–2014) as a function of parental risk constellations.

Variables	Model 1: Number of years in contact with healthcare services for anxiety/ depression (2008-14)	Model 2: Number of consultations/ visits with healthcare services for anxiety/depression (2008-14)
	Count	Count
	aIRR (95% CI)[a,b]	aIRR (95% CI)[a,b]
Sex (male)	0.87 (0.79–0.98)	0.64 (0.50–0.81)
Age at Young-HUNT baseline	0.98 (0.94–1.01)	0.97 (0.91–1.03)
Age at first registry follow-up in 2008	1.03 (1.02–1.05)	1.03 (1.01–1.05)
Adolescent offspring mental health (SCL-5)		
Bottom 75% (reference)	–	–
Top 25%	1.34 (1.18–1.53)	1.38 (1.11–1.72)
No response	1.29 (0.91–1.53)	1.34 (0.75–2.38)
Parental risk constellation/latent profiles[c]		
LP1	0.92 (0.79–1.07)	0.76 (0.58–1.00)
LP2	1.03 (0.74–1.43)	0.69 (0.40–1.18)
LP3 (reference)	–	–
LP4	1.20 (0.92–1.57)	1.09 (0.69–1.72)
LP5	0.91 (0.54–1.53)	0.57 (0.26–1.23)

[a]aIRR; adjusted incidence rate ratio with corresponding 95% CI. For brevity, estimates from the zero-inflated components (i.e. the odds of non-utilisation of healthcare) are not shown, as they do not address the substantive questions of interest.
[b]For brevity and in alignment with healthcare utilisation literature [29,30], estimates from the zero-inflated components (i.e. the odds of non-utilisation of healthcare) are not shown, as they do not address our substantive questions of interest.
[c]LP1: low education; LP2: multiple risks – binge drinking and mental-health symptoms in both parents; LP3: low overall risk; LP4: casual drinking in both parents; LP5: multiple risks – frequent drinking both parents, mental-health symptoms fathers).
SCL-5: five-item Hopkins Symptom Checklist 5 as self-reported at Young-HUNT.

participation. A similar pattern was observed for offspring's sex and age at first registry follow-up in 2008. Specifically, concerning the substantive questions of the extent of healthcare utilisation for anxiety and depression among offspring, the top 25 percentile of SCL-5 scores distribution, female sex and older age at first registry follow-up in 2008 were all significantly associated with both more years spent utilising healthcare and greater frequency of contacts with healthcare services (count components) during the seven-year follow-up period.

Discussion

In this study, we examined the association between parental risk constellations and the extent of offspring's utilisation of healthcare for anxiety and depression as measured both by the number of utilisation years and

by the number of related consultations/visits during the seven-year study period. Compared to the parental low-risk constellation, none of the other risk constellations were significantly associated with these outcomes. The strongest predictors were offspring's characteristics – specifically, elevated mental-health symptoms in adolescence and sex, as would be expected, given ample evidence for continuity of these mental-health issues across the lifespan [31] and greater likelihood of anxiety and depression among women [32,33]. As expected, older age at first registry follow-up was also positively associated with both examined aspects of healthcare utilisation for anxiety and depression.

Even though we examined the number of years spent using healthcare services for anxiety and depression, our findings align with the body of research reporting no major associations between parental risk factors and duration of anxiety or depression in offspring [7,8]. For instance, maternal depression was associated with subsequent onset of offspring anxiety and depression but not with the duration of these disorders in a large nationwide sample of US households [7]. Similarly, parental depression was associated with an increased risk of depression in offspring but not with the number or duration of depressive episodes in a small longitudinal community sample [9]. A set of German community studies that examined longitudinal associations between parental psychopathology and unfavourable family environments with offspring's social phobia reported that parental psychopathology was associated with onset [34] but not with the proportion of years affected since disorder onset [8].

Consistent with evidence from these studies, our results indicate that accumulated parental risks correlate primarily with offspring's risk of the disorder itself, and less with the management and treatment of the disorder through healthcare utilisation. Specifically, using the same sample, we have previously shown that compared to offspring in low-risk families, offspring of family constellations characterised by multiple risks (i.e. offspring of families with low education in both parents (LP1), and elevated frequencies and quantities of drinking in both parents, and symptoms of mental-health problems in fathers (LP5)) were at greater risk of subsequently receiving a diagnosis/treatment for anxiety/depression [4]. However, in the current study, offspring of family constellations characterised by multiple risks did not spend more years using the healthcare system, nor did they have more healthcare consultations for their anxiety and depression during the study period, than offspring of the low-risk constellation. The same held true of offspring of any of the remaining constellations. Seen in conjunction with previous research [7–9] and the initial findings from this sample [4], the entirety of our results suggest that parental risks may be more informative for understanding the aetiology of offspring's anxiety and depression than they may be for the understanding of their course, including the extent of healthcare utilisation.

In addition to adding to the literature by using a novel approach and providing a different perspective, there are important contextual and structural differences between our study and several of those referred to above, especially concerning access to education and healthcare. For example, in the USA, where most of the previous studies were conducted, access to healthcare varies significantly, and parental education may play a more decisive role in the process of accessing treatment for mental-health problems [35]. In the USA, about 30% of adolescents experience an anxiety disorder, of whom $<$20% receive treatment [36,37]. Getting access to evidence-based care may be challenging, even for privileged families and more so for families from rural and low SES backgrounds [37]. In Norway, education and healthcare are publicly funded, and barriers to access are minimal, resulting in universal access for all residents.

Consequently, results from Norwegian settings are less prone to common confounders. However, access to healthcare services does not necessarily entail their use. Among persons diagnosed with anxiety or depression through diagnostic interviews, less than half had registry records indicating contact with primary and/or specialist healthcare services for these disorders [38]. Based on the registry data used in the current study, we cannot say for sure whether the extent of healthcare utilisation reflects the severity of the disorder. However, the related literature provides ample evidence that individuals with more severe anxiety and depression use healthcare more frequently [10,11,39]. Taken together, our novel approach, combining health surveys and health registries, and the context in which the study was conducted strengthen the evidence suggesting that parental risk factors are linked with the risk of anxiety/depression in the first place but not necessarily with the extent or magnitude of healthcare utilisation for these disorders. Receiving an anxiety or depression diagnosis and the utilisation of healthcare for the disorder therefore appear to represent two different constructs shaped by different factors. For example, once a diagnosis has been made, treatment referral and treatment features may depend more on the treatment provider and the individual patient characteristics. Healthcare services are universal and not prohibitively expensive in Norway,

resulting in treatment decisions seldom being shaped by patients' financial backgrounds.

Methodological considerations

Major strengths of the study include the use of person-centred approaches to identify underlying yet previously unknown parental risk profiles based on information obtained from both parents. Combining health surveys and health registries to capture various aspects of healthcare utilisation for anxiety and depression, our findings contribute substantively to the knowledge base, until now consisting almost entirely of studies utilising a lifetime history approach or clinical interviews. Our sample included two-parent families, where offspring, mothers and fathers participated in the HUNT survey. While this limits generalisability, this approach avoided the single data source limitations and biases present in previous studies, where information about parental characteristics is provided only by offspring alone or by the offspring and one parent [18]. Even though our analytical sample was highly selective, this non-representativeness does not hinder inferences regarding the prospective associations between parental risk factors and offspring's healthcare utilisation for anxiety/depression [40].

Nevertheless, these findings should be considered within the specific context of this study, including the universal access to healthcare in Norway and a combination of administrative data obtained from national health registries with self-reported survey data. Both self-reports and registry data have their limitations. The first may be affected by recall bias, selective reporting and under-reporting [41]; the latter is conservative and captures only those who self-select into seeking help for, are diagnosed with or receive treatment for a given disorder [38]. Thus, while the actual rate of anxiety and depression may be higher than that officially recorded in health registries, the current study includes complete information about primary and specialist healthcare utilisation for anxiety and depression. The use of registries should also increase confidence about diagnostic accuracy, which may be an issue in studies where outcomes are captured using self-reporting.

Conclusions

Parental risk constellations were not prospectively associated with the utilisation of healthcare for anxiety and depression among the offspring during the seven-year study period. Offspring of four risky constellations did not spend more years using the healthcare system, nor did they have more healthcare consultations for their anxiety and depression during the study period, than the offspring of the low-risk constellation. Seen in conjunction with the initial set of results from this sample, accumulated parental risks may be thus more informative for understanding the aetiology of offspring's anxiety and depression than they may be for the understanding of management and treatment of such disorders, including the extent of healthcare utilisation, among offspring.

Acknowledgements

We thank The Nord-Trøndelag Health Study (the HUNT Study), a collaboration between the HUNT Research Centre (Faculty of Medicine and Health Sciences, NTNU, Norwegian University of Science and Technology), Trøndelag County Council, Central Norway Regional Health Authority and the Norwegian Institute of Public Health, for providing survey data for this study. We also thank Statistics Norway, the Norwegian Patient Registry and the Control and Payment of Health Reimbursements Registry for providing registry data for this study. Last but not least, we are grateful to all the HUNT and Young-HUNT participants.

Declaration of conflicting interests

The authors declared no potential conflicts of interest with respect to the research, authorship and/or publication of this article.

Funding

The authors received no financial support for the research, authorship and/or publication of this article.

ORCID iDs

Ingunn Olea Lund https://orcid.org/0000-0001-7412-4776
Helga Ask https://orcid.org/0000-0003-0149-5319
Jasmina Burdzovic Andreas https://orcid.org/0000-0002-6730-1321

References

[1] Polanczyk GV, Salum GA, Sugaya LS, et al. Annual research review: a meta-analysis of the worldwide prevalence of mental disorders in children and adolescents. *J Child Psychol Psychiatry* 2015;56:345–65.
[2] Merikangas KR, He JP, Burstein M, et al. Lifetime prevalence of mental disorders in U.S. adolescents: results from the national comorbidity survey replication-adolescent supplement (NCS-A). *J Am Acad Child Adolesc Psychiatry* 2010;49:980–9.
[3] Vos T, Barber RM, Bell B, et al. Global, regional, and national incidence, prevalence, and years lived with disability for 301 acute and chronic diseases and injuries in 188 countries, 1990–2013: a systematic analysis for the Global Burden of Disease Study 2013. *Lancet* 2015;386:743–800.

[4] Lund IO, Skurtveit S, Handal M, et al. Association of constellations of parental risk with children's subsequent anxiety and depression: findings from a HUNT survey and health registry study. *JAMA Pediatr* 2019;173:251–9.
[5] McLaughlin KA, Green JG, Gruber MJ, et al. Childhood adversities and adult psychiatric disorders in the national comorbidity survey replication II: Associations with persistence of DSM-IV disorders. *Arch Gen Psychiatry* 2010;67:124–32.
[6] McLaughlin KA, Breslau J, Green JG, et al. Childhood socio-economic status and the onset, persistence, and severity of DSM-IV mental disorders in a US national sample. *Soc Sci Med* 2011;73:1088–96.
[7] Kessler RC, Davis CG and Kendler KS. Childhood adversity and adult psychiatric disorder in the US National Comorbidity Survey. *Psychol Med* 1997;27:1101–19.
[8] Knappe S, Beesdo K, Fehm L, et al. Do parental psychopathology and unfavorable family environment predict the persistence of social phobia? *J Anxiety Disord* 2009;23:986–94.
[9] Weissman MM, Wickramaratne P, Nomura Y, et al. Offspring of depressed parents: 20 years later. *Am J Psychiatry* 2006;163:1001–8.
[10] Chiu M, Saxena FE, Kurdyak P, et al. Health service use among individuals with depression and psychological distress: a population-based cohort study in Ontario, Canada. *Can J Psychiatry* 2020;65:641–51.
[11] Birnbaum HG, Kessler RC, Kelley D, et al. Employer burden of mild, moderate, and severe major depressive disorder: mental health services utilization and costs, and work performance. *Depress Anxiety* 2010;27:78–89.
[12] Holst C, Schurmann Tolstrup J, Sørensen J, et al. Parental alcohol use disorder with and without other mental disorders and offspring alcohol use disorder. *Acta Psychiatr Scand* 2019;139:508–17.
[13] Amone-P'Olak K, Burger H, Ormel J, et al. Socioeconomic position and mental health problems in pre- and early-adolescents: the TRAILS study. *Soc Psychiatry Psychiatr Epidemiol* 2009;44:231–8.
[14] Green JG, McLaughlin KA, Berglund PA, et al. Childhood adversities and adult psychiatric disorders in the national comorbidity survey replication I: associations with first onset of DSM-IV disorders. *Arch Gen Psychiatry* 2010;67:113–23.
[15] Cuijpers P, Langendoen Y and Bijl RV. Psychiatric disorders in adult children of problem drinkers: prevalence, first onset and comparison with other risk factors. *Addiction* 1999;94:1489–98.
[16] Mahedy L, Hammerton G, Teyhan A, et al. Parental alcohol use and risk of behavioral and emotional problems in offspring. *PLoS One* 2017;12:e0178862.
[17] Holst C, Tolstrup JS, Sørensen HJ, et al. Parental alcohol use disorder with and without other mental disorders and offspring alcohol use disorder. *Acta Psychiatr Scand* 2019;139:508–17.
[18] Rossow I, Lambert F, Keating P, et al. Parental drinking and adverse outcomes in children – a scoping review of cohort studies. *Drug Alcohol Rev* 2016;35:397–405.
[19] Krokstad S, Langhammer A, Hveem K, et al. Cohort profile: the HUNT Study, Norway. *Int J Epidemiol* 2013;42:968–77.
[20] Holmen TL, Bratberg G, Krokstad S, et al. Cohort profile of the Young-HUNT Study, Norway: a population-based study of adolescents. *Int J Epidemiol* 2013;43:536–44.
[21] Holmen J, Midthjell K, Krüger Ø, et al. The Nord-Trøndelag Health Study 1995–97 (HUNT 2): objectives, contents, methods and participation. *Nor Epidemiol* 2003;13:19–32.
[22] Zigmond AS and Snaith RP. The Hospital Anxiety and Depression Scale. *Acta Psychiatr Scand* 1983;67:361–70.
[23] Leiknes KA, Dalsbø TK and Siqueland J. *Måleegenskaper ved den norske versjonen av Hospital Anxiety and Depression Scale (HADS) Psykometrisk vurdering*. Oslo, Norway: Folkehelseinsitituttet, 2016.
[24] Collins LM and Lanza ST. *Latent class and latent transition analysis with applications in the social, behavioral, and health sciences*. Hobroken, New Jersey: John Wiley, 2010.
[25] Strand BH, Dalgard OS, Tambs K, et al. Measuring the mental health status of the Norwegian population: a comparison of the instruments SCL-25, SCL-10, SCL-5 and MHI-5 (SF-36). *Nord J Psychiatry* 2003;57:113–8.
[26] Burdzovic Andreas J, Ask Torvik F and Lund IO. Prospective associations between parents' alcohol use patterns and the risk of high-school dropout among boys and girls: a combined HUNT survey and educational registry study. *Psychol Addict Behav* . Epub ahead of print 18 March 2021. DOI: 10.1037/adb0000681.
[27] Helsedirektoratet. *Aktivitetsdata for avtalespesialister 2020 Norsk pasientregister Rapport [in Norwegian]*. Oslo, Norway: Helsedirektoratet, 2021.
[28] Cameron AC and Trivedi PK. *Regression analysis of count data*. 2nd ed. Cambridge: Cambridge University Press, 2013.
[29] Slaunwhite AK and Macdonald S. Primary healthcare utilization for alcohol-attributed diseases in British Columbia Canada 2001–2011. *BMC Fam Pract* 2015;16:34.
[30] Elhai JD, Calhoun PS and Ford JD. Statistical procedures for analyzing mental health services data. *Psychiatry Res* 2008;160:129–36.
[31] Visser JH, Van Der Ende J, Koot HM, et al. Predicting change in psychopathology in youth referred to mental health services in childhood or adolescence. *J Child Psychol Psychiatry Allied Discip* 2003;44:509–19.
[32] Salk RH, Hyde JS and Abramson LY. Gender differences in depression in representative national samples: meta-analyses of diagnoses and symptoms. *Psychol Bull* 2017;143:783–822.
[33] McLean CP, Asnaani A, Litz BT, et al. Gender differences in anxiety disorders: prevalence, course of illness, comorbidity and burden of illness. *J Psychiatr Res* 2011;45:1027–35.
[34] Knappe S, Lieb R, Beesdo K, et al. The role of parental psychopathology and family environment for social phobia in the first three decades of life. *Depress Anxiety* 2009;26:363–70.
[35] Corrigan PW and Watson AC. The stigma of psychiatric disorders and the gender, ethnicity, and education of the perceiver. *Community Ment Health J* 2007;43:439–58.
[36] Merikangas KR, He JP, Burstein M, et al. Service utilization for lifetime mental disorders in U.S. adolescents: results of the National Comorbidity Survey Adolescent Supplement (NCS-A). *J Am Acad Child Adolesc Psychiatry* 2011;50:32–45.
[37] Allen KB, Benningfield M and Blackford JU. Childhood anxiety – if we know so much, why are we doing so little? *JAMA Psychiatry* 2020;77:887–8.
[38] Torvik FA, Ystrom E, Gustavson K, et al. Diagnostic and genetic overlap of three common mental disorders in structured interviews and health registries. *Acta Psychiatr Scand* 2018;137:54–64.
[39] Kujanpää T. *Generalized anxiety disorder and healthcare utilization*. PhD Thesis, University of Oulu, Finland, 2016.
[40] Rothman KJ, Gallacher JEJ and Hatch EE. Why representativeness should be avoided. *Int J Epidemiol* 2013;42:1012–4.
[41] Johnson TP. Sources of error in substance use prevalence surveys. *Int Sch Res Notices* 2014;2014.