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Adolescent mental health, disability conditions, and family socioeconomic status: a cross-national study of 16 countries

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ABSTRACT

Adolescents with disability conditions and from disadvantaged socioeconomic status (SES) report disproportionately low mental health. Yet, how disability status and inequalities interplay in explaining adolescent mental health across countries is unclear. Using an intersectional micro-macro approach, this study examined how adolescent mental health outcomes (i.e., life satisfaction and psychological complaints) differ by disability condition both within and across countries, and how country-level factors (i.e., public spending, income inequalities) and family-level SES moderate this relationship. We applied a two-step meta-analytic approach to data from 16 countries participating in the 2018 Health Behaviour in School-aged Children study ($N = 90{,}882$; age $= 13.5$). Results showed that adolescents with disabilities reported lower life satisfaction and higher psychological complaints than non-disabled adolescents in all countries. Country-level public spending and income inequalities were weak moderators of the relationship between adolescent disability and mental health. Adolescent mental health gaps by disability status were constant across SES groups in most of the countries that were examined. Yet, mental health gaps by adolescent disability status declined with family SES in some countries (i.e., Denmark, Ireland) and increased with family SES in some other countries (i.e., Austria, Czech Republic, France). The study implications and future research avenues are discussed.

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Introduction

Adolescence is a critical life-course stage for individuals' lifelong mental health. Half of adult mental health disorders have their onset before the age of 14, and three out of four before the age of 25 (Solmi *et al.*, 2022). Previous research found that adolescents with a chronic condition or a disability (CCD) face an increased risk towards developing mental health problems (Downs *et al.*, 2018; Rydzewska *et al.*, 2019). The prevalence of mental health disorders is twice as high among children and adolescents with disabilities as among those without disabilities (Totsika *et al.*, 2022). According to a recent meta-analysis, children and adolescents with CCD have an estimated prevalence from 3% to 5% for depressive symptoms and from 7% to 34% for anxiety disorders (Buckley *et al.*, 2020). This figure is particularly worrying if we consider that adolescents with disabilities seek and obtain less professional mental health assistance than non-disabled adolescents (Whittle *et al.*, 2018). Consequently, identifying the underlying factors that explain the mental health disadvantage of adolescents with CCD has critical scientific and policy implications.

Previous studies have contributed to understanding the mechanisms behind the mental health disadvantage of adolescents with CCD. One study highlighted that increased exposure to factors like social isolation, bullying, and stigma among disabled adolescents is directly associated with their elevated stress, as well as with their reduced opportunities for social participation linked to positive mental health (Sentenac *et al.*, 2011). Other research has pointed at the psychological distress that adolescents with CCD experience resulting from frequent and persistent pain, functional limitations, and dependence on caregivers, which undermines their sense of autonomy and self-efficacy linked to poorer mental health (Pinquart and Shen, 2011). Other studies indicated that parents with disabled children experience poor health and well-being, particularly among mothers and families from disadvantaged socioeconomic status (SES) (Balbo and Bolano, 2024), which in turn limits the ability of families to provide adequate support to foster positive well-being among their disabled children. Additionally, studies have highlighted that mental health services are often not well equipped to support individuals with disabilities, and this exacerbates the vulnerable mental health condition of adolescents with CCD (Buckley *et al.*, 2020; Downs *et al.*, 2018).

Despite growing research in the field, previous literature has omitted an integrated micro-macro approach to understand how structural contexts shape differences in mental health outcomes between disabled and non-disabled adolescents. Our study addresses this knowledge gap by investigating how adolescents with CCD differ in their mental health from adolescents without CCD, examining both micro-level (i.e., family SES) and country-level (i.e., public spending, income inequalities) mechanisms.

Our study contributes to existing literature on adolescent disabilities, mental health, and inequalities in two main directions. First, we develop an *intersectional approach* to existing sociological research on social stratification that situates family SES as a key variable to study disparities between adolescents with and without CCD. While previous sociological research has revealed that family SES intersects with disabilities in shaping adolescents' opportunities (Chatzitheochari, Velthuis and Connelly, 2022; Parsons and Platt, 2013), the literature has to date not provided a systematic analysis of whether the mental health disadvantage of adolescents with CCD is more pronounced for low-SES than for high-SES families. Moreover, these processes have not yet been tested across countries with different policies and cultural characteristics. To tackle this gap, our study examines how the association between disability status and adolescent mental health differs by family SES across multiple countries.

Second, we adopt a cross-national comparative perspective that focuses on various macro-level explanatory processes. To date, most existing research on disabled adolescents' mental health has focused on single-country data (Downs *et al.*, 2018; Rydzewska *et al.*, 2019). Research indicates that countries differ substantially in their healthcare provision, educational systems, social policies, and cultural norms oriented to disabled youth health (Sentenac *et al.*, 2023). One study on 19 European countries found that countries with a higher proportion of students having CCD in mainstream schools had the highest proportion of negative school experiences among CCD adolescents (Sentenac *et al.*, 2023). We expand this cross-national body of literature by examining how macro-level factors associated with government generosity (i.e., health expenditure, educational support) and inequality systems (i.e., economic inequalities) may contribute to explaining existing gaps in mental health between disabled and non-disabled adolescents.

Our study addresses three main research questions: (a) How do adolescents with and without CCD differ in their mental health within and across countries? (b) How do country-level factors related to government spending and income inequalities moderate the association between adolescent CCD and mental health? (c) How do mental health gaps between CCD and non-CCD adolescents differ by family SES across countries? To answer these questions, we draw on comparable harmonised cross-national survey data from 16 countries included in the Health Behaviour in School-aged Children (HBSC) study and apply a two-step meta-analytic statistical approach (Liefbroer and Zoutewelle-Terovan, 2021).

Background

Conceptualisation of adolescent disabilities

We define disabilities as long-term physical, mental, intellectual, or sensory impairments that may hinder individuals' full and effective participation in society on an equal basis with others (Shakespeare, 2013; WHO, 2022). As defined by the World Health Organization (WHO, 2022), disability is an umbrella term encompassing at least one of three conditions, capturing (a) impairments (i.e., problems in body function or structure), (b) activity limitations (i.e., difficulties in executing tasks), and (c) participation restrictions (i.e., problems in involvement in life situations). Our conceptualisation of CCD is aligned with definitions elaborated in inclusive education, where a disability condition refers to individuals with special needs who have physical, intellectual, social, emotional, linguistic, or other conditions that require support and services to match these needs (UNESCO, 1994). We define CCD as long-term physical or mental health problems, illnesses, or disabilities that have lasted or are expected to last at least six months and have resulted in functional limitations or the need for special care (Inchley *et al.*, 2018), ranging from physical disabilities (e.g., mobility impairments, visual impairments) and neurodevelopmental disorders (e.g., ADHD, autism) to long-term physical illnesses (e.g., asthma, diabetes). It is important to stress that we distinguish CCD from mental health disorders such as depression or anxiety.

Disabilities arise in a wide range of circumstances that condition adolescents' health and well-being (Krahn, Walker and Correa-De-Araujo, 2015). For some individuals, disabilities are present from birth or emerge in early childhood because of congenital conditions or developmental disorders. Others may develop a disability later in life owing to illness, injury, or other life events. These varied pathways highlight the complex and dynamic nature of disabilities, consistent with biopsychosocial conceptions such as the International Classification of Functioning, Disability, and Health (WHO, 2007) and with social and capability approaches that emphasise structural determinants (Mitra, 2006; Shakespeare, 2013; WHO, 2011). Existing literature further distinguishes different types of disabilities (e.g., cognitive, physical, sensory, and psychosocial disabilities), each potentially involving distinct forms of psychological disadvantage and support needs and distinct mechanisms operating in adolescent well-being outcomes (Krahn, Walker and Correa-De-Araujo, 2015; Pinquart and Shen, 2011).

In this study, while we acknowledge the diversity of causes, typologies, and severities of disability during adolescence, we adopt a working definition of an umbrella term that includes adolescents with a CCD, as defined in previous research (Sentenac *et al.*, 2023). We consider adolescents with CCD as a broad group of young people who—despite their heterogeneity in health conditions—share an increased risk of exclusion and adverse outcomes owing to their same chronic condition or disability. This approach allows us to represent and study a population group that is often underserved and faces structural and psychosocial challenges through a harmonised cross-country definition.

Theoretical perspectives on adolescent disability and mental health

Several theoretical perspectives have been developed to explain how adolescent mental health differs by disability status, and what societal factors lead to different outcomes among adolescents with and without CCD.

A first important theoretical approach to consider is Bronfenbrenner and Morris's (2007) bioecological model. The *bioecological model* explains youth development by incorporating four principal components—process, person, context, and time—and the dynamic and interactive relationships among them in shaping individuals' present and future well-being (Bronfenbrenner and Morris, 2007). This framework has clear applications to the study of disparities in adolescent outcomes. Through the lens of a bioecological model, the well-being of adolescents with CCD is a function of multiple, nested systems in interaction. Following this approach, daily interactions with family, peers, teachers, and health professionals are crucial, which in the case of adolescents with CCD may involve stigma, exclusion, or access to supportive relationships (Ali *et al.*, 2012; Green *et al.*, 2005). Two levels of analysis are particularly relevant to this model: the microsystem and the macrosystem. The *microsystem* highlights immediate contexts such as family resources, parental support, and inclusive schooling. Meanwhile, the *macrosystem level* captures cultural norms and institutional arrangements such as welfare regimes, disability rights, and inclusivity policies shaping how societies respond to disabled youth.

The bioecological model can be applied to disabilities with a focus on stigma. Goffman's (1963) classic work on stigma already highlighted how individuals with certain visible or perceived traits may become socially discredited, leading to experience exclusion, devaluation, or psychological stress. Adolescents with CCD often encounter stigmatising attitudes in schools and communities, which can undermine self-esteem and increased risks of anxiety and depression (Ali *et al.*, 2012; Green *et al.*, 2005). Structural discrimination considers institutional and systemic practices that marginalise stigmatised individuals with disabilities—such as insufficient school accommodations, lack of inclusive programmes, or biased treatment by educators and peers—thereby reinforcing health disadvantages from early adolescence onward (Shakespeare, 2013).

Another key perspective is *intersectionality* (see Chatzitheochari, Velthuis and Connelly, 2022). This approach considers the coexistence of multiple hierarchies of disadvantage among disabled populations and consequently defines disabilities in intersection with variables like social class and race/ethnicity in shaping inequalities in youth health (Jenkins, 1991; Shifrer and Frederick, 2019). From an intersectional perspective, as pointed out by Shifrer and Frederick (2019), while disabled adolescents are subject to high levels of structural discrimination and stigma, disabled adolescents from lower-SES backgrounds may be particularly disadvantaged. For example, low-SES adolescents with disabilities may experience double processes of discrimination, owing to a lack of resources at home to minimise potential harm associated with their disability condition.

Finally, from the perspective of *family systems theory*, factors such as the quality of communication with parents and perceived parental support act as protective mechanisms of the well-being of adolescents with disabilities (Frost, Devaney and Herrera-Pastor, 2020). Consequently, positive familial relationships may act as buffers against the psychological distress linked to disability status. For instance, adolescents with CCD who feel emotionally supported and understood by their parents may be better equipped to cope with the challenges of stigma or exclusion in other social environments, thereby sustaining more positive mental health outcomes compared with peers lacking such support within the family.

Considering these different theoretical perspectives, we develop a novel micro-macro perspective to the literature. By explicitly integrating family-level mechanisms with broader structural and policy contexts, our study allows us to examine how adolescents' daily experiences of disability are embedded in wider societal arrangements. Specifically, our theoretical framework addresses how adolescents with CCD differ in their mental health from adolescents without CCD across countries, while examining both micro-level (i.e., family SES) and country-level (i.e., public spending, income inequalities) mechanisms.

Micro-level processes: the role of family SES

Social stratification scholarship shows that high-SES families have access to multiple resources and engage in compensatory practices to maximise their children's health, academic, and socioemotional outcomes (Bernardi and Grätz, 2015; Gil-Hernández, 2021; M. I. Jackson, 2015; Pietropoli and Gracia, 2025). Families from privileged SES groups have access to a range of social, cultural, and economic capitals (Bourdieu, 1986), and they are often well equipped to reduce stress related to their financial security (Conger and Conger, 2002), having also higher monetary and time resources to invest in their children (Kalil and Ryan, 2020). Studies have found that adolescents from higher-SES backgrounds report higher mental health than their low-SES counterparts (Reiss, 2013). A key question within our study is whether gaps in mental health between adolescents with and without CCD differ across SES groups.

Previous research has indicated that the poor subjective mental well-being of youth with disabilities documented (Canha *et al.*, 2016) partially reflects unequal access to material and social resources (at the micro level) rather than chronic conditions or disabilities *per se* (Savage *et al.*, 2014). Further, research has found that low mental well-being scores among youth with CCD are profoundly influenced by poor social and material living conditions, suggesting that prolonged exposure to socioeconomic disadvantages has a substantiated negative impact on the health and well-being of adolescents with CCD (Emerson, 2004; Honey, Emerson and Llewellyn, 2011). Research conducted in the United Kingdom found that greater family socioeconomic disadvantage is strongly associated with increased risk of poor psychological well-being for children with CCD (Emerson and Hatton, 2007). Similarly, an international report on high-income countries highlighted that 20–50% of the risk of poorer mental and physical health for children with CCD is explained by having a disadvantaged socioeconomic condition (Emerson *et al.*, 2012). While research has suggested that the experience of childhood disability is socially stratified (Chatzitheochari, Velthuis and Connelly, 2022; Jenkins, 1991; Parsons and Platt, 2013; Shifrer and Frederick, 2019), whether families across SES groups differ in promoting the well-being of children with CCD has been an omitted question from previous literature.

We anticipate that mental health gaps between adolescents with CCD and those without CCD will be partly reduced in higher-SES families. Adolescents with a physical-related disability may cope better with disadvantages linked to internalising problems or bullying when they grow up in more affluent families, as their parents have more privileged resources to protect their mental health (e.g., the ability to supervise them, arrange extracurricular activities, and access additional care support). These advantages, in turn, may reduce adolescents' stress and improve their physical activity, social relations, or confidence. By contrast, lower-SES families tend to lack these resources, which should have a ripple effect on the type of leisure, care, and learning experiences facilitated within their family.

Macro-level processes: the role of public spending and income inequalities

Previous studies indicated that countries with more comprehensive welfare states and greater investment in public health infrastructure exhibit reduced health inequalities among adolescents (Pickett and Wilkinson, 2015), including those with disabilities (WHO, 2008). Also, macro-level social determinants like national income inequality, welfare support, and inclusive education policies have been identified as influential factors of adolescents' mental health. This suggests that broader socio-political contexts may significantly moderate the impact of micro-level disadvantages in the context of vulnerable youth and families (Currie *et al.*, 2009; Rajmil *et al.*, 2014).

To date, the mechanisms through which some macro-level determinants reduce mental health inequalities are uncertain. For example, higher education expenditure alone does not necessarily translate into more inclusive educational environments that foster a reduction in mental health disorders. Studies have demonstrated that even within ostensibly inclusive education systems, adolescents with CCD frequently face increased bullying, social exclusion, and stigma, indicating the complexity of fostering truly inclusive educational settings (Rose and Gage, 2017; Schwab, Sharma and Loreman, 2018). Nonetheless, when inclusiveness is implemented, for example through tailored support services, anti-bullying programmes, and inclusive curricula that require spending, the adverse mental health of adolescents with disabilities could be partly mitigated (Humphrey and Symes, 2013; McCoy & Banks, 2012).

We examine how macro-level socioeconomic factors explain mental health gaps between adolescents with and without CCD. To begin with, we investigate whether SES gaps in adolescent mental health by disability status are constant or dissimilar across countries with different policies and cultural characteristics. Additionally, we focus on the role of country-level characteristics—specifically total health expenditure, educational support, and income inequality—in potentially moderating the existing inequalities in mental health between CCD and non-CCD adolescents.

We argue that (a) government public investment, such as health and education spending, should equalise gaps between CCD and non-CCD adolescents in mental health, and (b) country-level income inequalities may reinforce the mental health disadvantages experienced by adolescents with CCD. Total expenditure on education and health are proxies for public commitment to welfare and inclusion in international adolescent research (Brons *et al.*, 2024; Inchley *et al.*, 2018), thus indicating the societal capacity to finance accessibility and quality among CCD youth (staffing, coverage, timeliness). Therefore, total health and education expenditure could translate into a better social infrastructure that contributes to alleviating the professional support that vulnerable groups like adolescents with CCD receive. For example, higher national health expenditure can bolster the provision of comprehensive healthcare services, ensuring that mental health and chronic condition interventions are adequately funded and accessible for social groups facing multiple types of disadvantages (Viner *et al.*, 2012). Similarly, universal educational policies that integrate health services within school environments and promote inclusive education could facilitate early detection and management of mental health problems, while promoting inclusive support structures for adolescents with disabilities (OECD, 2021). Finally, as more unequal countries tend to limit access to quality services and equality of opportunities among disadvantaged groups (Marmot, 2005; Reiss, 2013), we further argue that country-level income inequalities could further exacerbate existing mental health disparities between CCD and non-CCD adolescents. For example, in highly unequal countries, the benefits of public investments on young people may be unevenly distributed, thus disproportionately favouring the most advantaged groups, leaving adolescents with CCD more vulnerable to persistent mental health problems.

Methodology

Data

Data were drawn from 16 European countries included in the 2018 Health Behaviour in School-aged Children (HBSC) study. HBSC is a school-based survey that collects data every four years from adolescents aged 11, 13, and 15 years old. All participating countries use a representative sampling for their respective school-aged adolescents and follow a standard protocol, ensuring that the data collection takes place during the same school year and using the same methodology. In the HBSC data, only adolescents from mainstream schools are sampled. Since the Salamanca Statement (UNESCO, 1994), 95 governments agreed on developing educational policy, where mainstream schools should accommodate all children with special needs. Thus, schooling should offer a continuum of support and services to these children's needs. Hence, special school provision across countries has largely changed since this consensus, and it now spans a full continuum, from sizeable parallel systems to tiny, highly specialised safety nets. For example, Austria's *Sonderschulen* and England's 1,050 special schools illustrate jurisdictions (along with Poland, Wales, and Scotland) that still educate large numbers of pupils outside the mainstream. At the other extreme, Finland's six state special schools and Sweden's eight national schools cater only for low-incidence disabilities. Armenia is converting its remaining special schools into resource centres, and the rest (France, Ireland, Czech Republic, Hungary, Slovakia, Bulgaria, and Georgia) fall in between—diversity that underlines why HBSC necessarily sampled only mainstream settings.

Our sample started with a total of 90,882 cases. There were no missing data for *Country* and *Sex*, whereas there were missing values for *Life Satisfaction* (missing = 1,545), *Psychological Complaints* (missing = 1,847), *CCD* (missing = 4,339), and *Age* (missing = 509). However, analyses suggested that data were missing at random (more information can be found in the Supplementary Table S1). Therefore, we used the restricted maximum likelihood method (McNeish and Stapleton, 2016) to handle missing data in our analyses.

Dependent variables

To measure adolescent mental health, two variables were used: *Psychological Complaints* and *Life Satisfaction*. *Psychological Complaints* is derived from the Multiple Health Complaints eight-item instrument that captures the frequency of the physical and psychological complaints in the past six months (i.e., headache, abdominal pain, backache, dizziness, feeling low, irritability or bad mood, feeling nervous, and difficulties in getting to sleep). For the purpose of this paper, *Psychological Complaints* were derived from the items feeling low, irritability or bad mood, feeling nervous, and difficulties in getting to sleep, in accordance with previous research approaches (Schrijvers *et al.*, 2024). Adolescents rated the frequency of each health complaint on a 5-point scale from 1 = “about every day” to 5 = “rarely or never”. The responses were reversed and recoded into a scale ranging from 0 = “rarely or never” to 4 = “about every day”. The mean scores and standard deviations were further calculated and included in the analyses. The multiple health complaints measure has been shown to have acceptable test–retest reliability, internal consistency, and a bidimensional model is supported in most countries (Heinz *et al.*, 2022). Analyses show an acceptable internal consistency in our sample for our analyses for the four items included in the psychological complaints’ domain ($\alpha = 0.73$; Taber, 2018). *Life Satisfaction* was assessed with the one-item visual-analogue Cantril Ladder Scale through wording suitable for children as young as 11 years old. Respondents ticked the number next to the step that best described the position on the ladder where they feel they stand, ranging from “worst possible life for you” (0) to “best possible life” (10). The measure has extensive evidence of validity and reliability (Levin and Currie, 2014). The mean scores and standard deviations of such a scale were calculated and included in the analyses.

Independent and control variables

We used two main micro-level explanatory variables: disability conditions and family SES. To measure *Disability Conditions*, we used the Chronic Conditions Short Questionnaire, validated in a school-based population (Mazur *et al.*, 2018). Aligned with the World Health Organization's definition of disability provided in the background section (WHO, 2022), this questionnaire was designed to capture the occurrence of long-term health conditions, including long-term illness, disability, and medical conditions among adolescents. We use the umbrella term of chronic conditions or disabilities in this study, following previous literature (Sentenac *et al.*, 2023). Students with CCD were defined according to their answers provided to the following question: "Do you have a long-term illness, disability, or medical condition that was diagnosed by a doctor?" (yes/no). The questionnaire provided examples of different types of health conditions and disabilities (diabetes, arthritis, or cerebral palsy) and contained two further questions ("Do you take medicine for your long-term illness, disability, or medical condition? Does your long-term illness, disability, or medical condition affect your attendance and participation at school?"). Following the categorisation of Sentenac and colleagues (2023), and because we are specifically interested in examining differences in adolescent mental health by disability status rather than in medication use or school participation, we categorised respondents into those with/without CCD based on their answer to the following question: "Do you have a long-term illness, disability, or medical condition that was diagnosed by a doctor?"

Family Socioeconomic Status (SES) was measured by the Family Affluence Scale III (FAS), which is a set of six items designed and validated within the HBSC study (Torsheim *et al.*, 2016). The scale is suitable for use with children in the 11- to 15-year-old range and measures participants' socioeconomic status by monitoring self-reported access to family resources available in the home (i.e., car, own bedroom, computers, bathrooms, dishwasher, and holidays). An ordinal cumulative score can be computed by adding individual items, or a continuous Ridit score can be derived via the ranking of cumulative proportions. Previous validations support the construct and concurrent validity of the measure. While FAS largely captures material domains, previous research has shown that FAS has a moderate correlation with the actual parental earned income. This suggests that FAS can be used as an alternative measure of parental income in studies using self-reported SES among adolescents (Corell *et al.*, 2021). The cross-country validity of FAS has been proven in previous studies (Torsheim *et al.*, 2016). Unfortunately, the HBSC does not include measures of parental education and occupational class, as FAS is primarily a variable that captures social exclusion with a focus on material-based resources. Also, the lack of measures of cultural capital in the HBSC data limits our ability to study how culturally related mechanisms secure (dis)advantage among disabled kids from different social classes, thus obscuring patterns of structural inequalities that may, for example, relate to ableism (e.g., Neely-Barnes *et al.*, 2010).

We used three macro-level variables. (a) *Educational Expenditure* was measured as a percentage of the gross domestic product (GDP); (b) *Health Expenditure* was measured as a percentage of the GDP allocated to health; and (c) *GINI Coefficient* was a continuous variable ranging from 0 to 100, where 0 indicates perfect equality (everyone has the same income). Data were obtained from the World Bank Databank. Ideally, more specific indicators—such as the extent of inclusive education policies or targeted disability support programmes—would directly capture relevant institutional environments. However, such policy-specific data are not consistently available across the HBSC countries and years, and no reliable cross-country indicators are capturing these variables for our countries and the period of study. We treat total spending as a comparable proxy for state investment in infrastructure that can improve accessibility, affordability, and quality, but also acknowledge that this measure cannot distinguish system universality, targeting, or inclusion safeguards.

All the models controlled for both *Age* (as a continuous variable) and *Gender* (boy vs. girl), as previous research has systematically shown marked differences in mental health between girls and boys, and across different developmental stages of adolescence (Bor *et al.*, 2014; Herrmann *et al.*, 2024; Viner *et al.*, 2012).

Empirical strategy

Supplementary Tables S2 and S3 show the normal distribution, missing data, and correlation between the dependent variables for each country. Skewness and kurtosis values were within the acceptable ranges for normality (Kim, 2013; Tabachnick and Fidell, 2007), and the correlation coefficients ranged from −0.108 (Georgia) to −0.523 (Ireland).

We applied three statistical procedures in four steps. First, we employed a meta-analytic approach to explore differences in mental health between adolescents with and without CCD. Second, we investigated potential moderators using a meta-regression approach. Third, we used linear mixed models to examine whether the outcome variables vary between adolescents with and without CCD in relation to family SES within each country. Finally, we meta-analysed the estimates retrieved from the linear mixed-effects model for each of the 16 countries. While for the first two steps, using a meta-analytic approach is common practice to investigate different standardised mean differences across different populations, for steps three and four, we had to use a different approach, compared with the usual multilevel modelling, to account for the small number of clusters, namely countries. As our research investigates country-level differences, and our data include only 16 country clusters, we decided not to fit multilevel models. Our decision is aligned with research recommendations and simulations, which have consistently shown that with fewer than about 20–30 clusters, multilevel estimators produce downward-biased second-level variance components, underestimated standard errors, inflated Type I error, and frequent convergence problems (Bell *et al.*, 2010; Maas and Hox, 2005; McNeish and Stapleton, 2016). Therefore, we explored different approaches and opted for a meta-analytic approach, as suggested by Liefbroer and Zoutewelle-Terovan (2021).

Meta-analysis. A meta-analytic approach was employed to investigate the differences in mental health between adolescents with and without CCD across countries (research question 1). For each country, the standardised mean difference (Hedges' *g* effect size, ES) and the ES standard error were calculated and included in the meta-analytic synthesis. For the two meta-analyses on *Life Satisfaction* and *Psychological Complaints*, the Hedges' *g* values were calculated by subtracting the mean scores of adolescents with CCD from the mean scores of adolescents without CCD (CCD-yes − CCD-no). For *Life Satisfaction*, this resulted in *negative* values if adolescents *without* CCD had higher scores on *Life Satisfaction* (where higher scores indicate better life satisfaction), whereas for *Psychological Complaints*, this resulted in *positive* values if adolescents *with* CCD had higher scores (where higher scores indicate more frequent psychological complaints). Data were pooled using the inverse variance methods (Doi *et al.*, 2015) available in the *metagen* function for pre-calculated continuous ES data in the R Studio package *meta* (Balduzzi, Rücker and Schwarzer, 2019; Schwarzer, Carpenter and Rücker, 2015), which is a method used to weight each estimate based on the different population sizes.

A random-effects model based on the Hartung–Knapp–Sidik–Jonkman adjustment was used to improve the estimation of confidence intervals in random-effects meta-analysis (IntHout, Ioannidis and Borm, 2014), resulting in more robust estimates of between-study (*between-country*) variance when the number of ES included in the meta-analysis is small. The following scale of magnitude was used to interpret the ES of the pooled meta-analytic effect: <0.2 = trivial; 0.20–0.49 = small; 0.50–0.80 = moderate; and >0.80 = large (Cohen, 1988). Further, the interpretation of the ES was also based on the confidence intervals (Hopkins, 1997). To estimate the variance (Tau^2) across the countries as well as the 95% confidence interval, the restricted maximum-likelihood estimator for Tau^2 (Mengersen and Schmid, 2013) and the Q-Profile method for confidence interval of Tau^2 and *Tau* were used (D. Jackson and Bowden, 2016).

Alongside the Tau^2, the heterogeneity (the variation across the countries) was further investigated using the I^2 estimator. The following scale of interpretation was used: 0–40% = might not be important; 30–60% = may represent moderate heterogeneity; 50–90% = may represent substantial heterogeneity; and 75–100% = considerable heterogeneity (Higgins *et al.*, 2023).

Meta-regression. To explore which roles country-level characteristics play in explaining differences between adolescents with and without CCD in their mental *health* (research question 2), a series of meta-regressions was performed using the *metareg* function in R Studio (Balduzzi, Rücker and Schwarzer, 2019). Country-level characteristics (percentage of GDP spent on education, percentage of GDP spent on health, and GINI index) were treated as continuous variables and a mixed-effects model was employed, with the R^2 value used to estimate the amount of heterogeneity explained by the country-level factor.

Linear mixed-effects model. To examine the extent to which the outcome variables (*Life Satisfaction* and *Psychological Complaints*) vary between adolescents with and without CCD in relation to family SES within each country (research question 3), a two-step meta-analytic approach was used. First, a linear mixed-effects model was performed using the *lme4* package in R Studio (Bates *et al.*, 2014) for each of the 16 countries included in the analysis. The model also incorporated a random intercept for clusters (school level) to account for cluster variability. Model estimation was performed using the restricted maximum likelihood method for missing values (McNeish and Stapleton, 2016) and Satterthwaite's approximation was applied for estimating degrees of freedom and statistical significance (Kuznetsova, Brockhoff and Christensen, 2017). The model was specified as follows:

$$Outcome\,Variable \sim Disability\,Status * SES + Sex + Age + (1 \mid School)\,,$$

where the outcome variable was defined as *Life Satisfaction* or *Psychological Complaints*; *Disability Status* was defined as the presence of a disability or chronic condition diagnosed by a doctor; and *SES* was retrieved by the FAS and defined as a continuous variable, with higher values indicating higher SES. Second, the 16 model estimates were meta-analysed to investigate the overall pooled effect of the interaction between family SES and disability status in the outcome variables across the countries.

Results

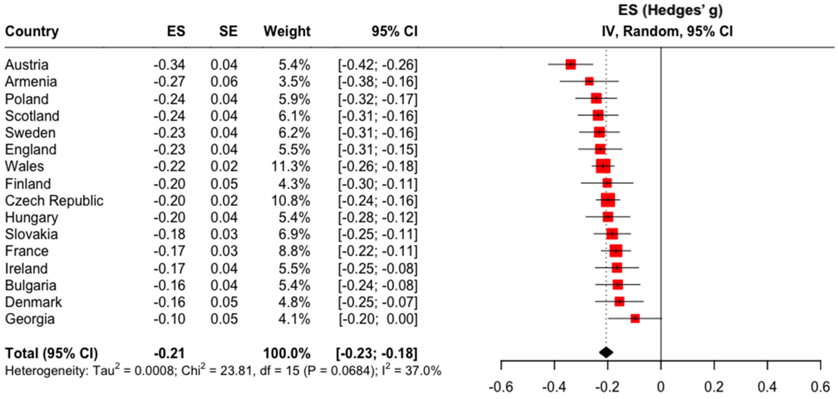
Descriptive analyses

Basic sociodemographic characteristics of all countries included in the analyses are reported in Table 1. Our sample consisted of 104,812 adolescents (49.7%

Table 1. Basic sociodemographic characteristics of the countries included in the analyses.

Country	*N*	Age	Gender (% girls)	CCD (% CCD)	LS (mean)	PC (mean)	IRFAS	GINI Index	Health Expenditure (% GDP in 2018)	Education Expenditure (% of GDP in 2018)
Armenia	4,717	13.51	50.1	8.1	8.34	1.12	4.12	34.4	10.01	2.8
Austria	4,129	13.28	50.7	17.4	7.71	1.19	9.25	30.8	10.35	5.2
Bulgaria	4,548	13.54	51.6	14.3	7.83	1.38	7.25	41.3	7.33	4.0
Czech Republic	11,564	13.37	49.7	25.6	7.8	1.39	8.05	25	7.46	4.3
Denmark	3,181	13.33	51.4	18.8	7.68	1.21	9.61	28.2	10.1	7.3
England	3,397	13.42	46.6	23.2	7.45	1.46	9.04	33.7	9.74	5.2
Finland	3,146	13.92	50.3	26.7	7.75	1.45	8.84	27.3	9.05	6.3
France	9,170	13.3	50.5	17.2	7.66	1.45	8.52	32.4	11.21	5.4
Georgia	4,242	13.45	50.3	10.9	7.95	1.15	5.24	36.4	6.99	3.5
Hungary	3,789	13.52	52.8	19.3	7.58	1.41	7.26	29.6	6.58	4.6
Ireland	3,833	13.41	49.4	20.3	7.55	1.28	9.22	30.6	6.48	3.4
Poland	5,224	13.59	50.8	14.9	7.48	1.49	7.76	30.2	6.31	4.6
Scotland	5,021	13.52	51.8	16.5	7.62	1.32	8.99	33.7	9.74	5.2
Slovakia	4,785	13.32	48.7	22.5	7.64	1.34	7.72	26.5	6.67	4.0
Sweden	4,185	13.63	50.3	23.3	7.46	1.59	9.35	30	10.94	7.6
Wales	15,951	13.52	49.9	18.8	7.62	1.36	9.25	33.7	9.74	5.2

Notes: *N*, sample size; CCD, chronic conditions or disabilities, LS, *Life Satisfaction* mean score; PC, *Psychological Complaints*; IRFAS, Family Affluence Scale; GDP, gross domestic product.



Country	ES	SE	Weight	95% CI
Austria	-0.34	0.04	5.4%	[-0.42; -0.26]
Armenia	-0.27	0.06	3.5%	[-0.38; -0.16]
Poland	-0.24	0.04	5.9%	[-0.32; -0.17]
Scotland	-0.24	0.04	6.1%	[-0.31; -0.16]
Sweden	-0.23	0.04	6.2%	[-0.31; -0.16]
England	-0.23	0.04	5.5%	[-0.31; -0.15]
Wales	-0.22	0.02	11.3%	[-0.26; -0.18]
Finland	-0.20	0.05	4.3%	[-0.30; -0.11]
Czech Republic	-0.20	0.02	10.8%	[-0.24; -0.16]
Hungary	-0.20	0.04	5.4%	[-0.28; -0.12]
Slovakia	-0.18	0.03	6.9%	[-0.25; -0.11]
France	-0.17	0.03	8.8%	[-0.22; -0.11]
Ireland	-0.17	0.04	5.5%	[-0.25; -0.08]
Bulgaria	-0.16	0.04	5.4%	[-0.24; -0.08]
Denmark	-0.16	0.05	4.8%	[-0.25; -0.07]
Georgia	-0.10	0.05	4.1%	[-0.20; 0.00]
Total (95% CI)	**-0.21**		**100.0%**	**[-0.23; -0.18]**

Heterogeneity: $Tau^2 = 0.0008$; $Chi^2 = 23.81$, df = 15 (P = 0.0684); $I^2 = 37.0\%$

Figure 1. Forest plot. Pooled estimate of difference between adolescents with and without chronic conditions or disabilities (CCD) in *Life Satisfaction* scores across countries.

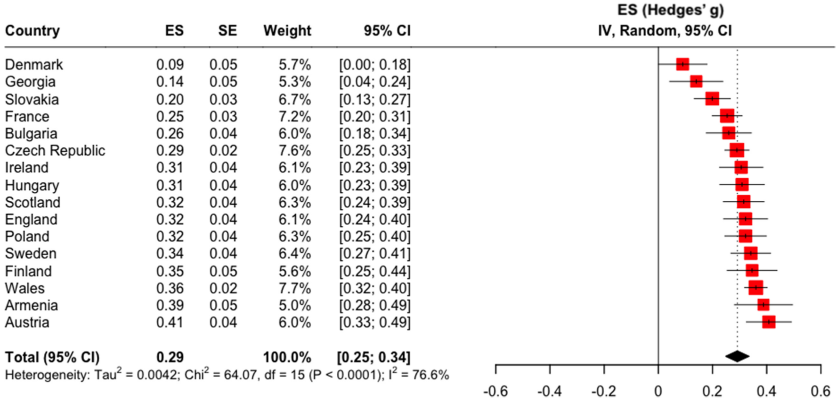
Notes: The vertical line represents the no-difference (effect size = 0) line between adolescents with and without chronic conditions or disabilities (CCD). Values of the left of this line indicate that adolescents without CCD reported higher scores in *Life Satisfaction* compared with their counterparts with CCD. The red boxes represent the ES (Hedges' *g*) and the weight of each country, and the horizontal lines represent the 95% CI for each single estimate. The dotted vertical line and the black diamond represent the pooled estimate and its related 95% CI. ES, effect size; SE, standard error, CI, confidence interval, IV, inverse variance.

boys), of whom 17.7% reported the presence of a disability or long-term chronic condition.

Meta-analysis of life satisfaction and psychological complaints

Figure 1 shows the forest plot of the pooled estimate of the difference in the *Life Satisfaction* scores between children with and without CCD across the 16 countries included in the analyses. A trivial-to-small statistically significant difference was found in the pooled effect (ES = −0.21; 95% CI, −0.23 to −0.18; $t = -16.72$; $p < 0.0001$), suggesting that across the countries included in the meta-analysis, adolescents with CCD reported overall lower *Life Satisfaction* than adolescents without CCD. Heterogeneity in the data was moderate ($I^2 = 37\%$; 95% CI, 0.00% to 65.3%), indicating that 0.00% to 65.3% of variation is due to differences between countries rather than sampling error, as confirmed by the between-country standard deviation (*Tau* = 0.03; 95% CI, 0.00 to 0.07).

Figure 2 shows the forest plot and the pooled estimate of the differences in the *Psychological Complaints* scores between children with and without CCD across the 16 countries. A small statistically significant difference was found in the pooled effect (ES = 0.29; 95% CI, 0.25 to 0.34; $t = 14.09$; $p < 0.0001$), suggesting that across the countries included in the meta-analysis, children with CCD reported higher scores of *Psychological Complaints* compared with their counter-



Country	ES	SE	Weight	95% CI
Denmark	0.09	0.05	5.7%	[0.00; 0.18]
Georgia	0.14	0.05	5.3%	[0.04; 0.24]
Slovakia	0.20	0.03	6.7%	[0.13; 0.27]
France	0.25	0.03	7.2%	[0.20; 0.31]
Bulgaria	0.26	0.04	6.0%	[0.18; 0.34]
Czech Republic	0.29	0.02	7.6%	[0.25; 0.33]
Ireland	0.31	0.04	6.1%	[0.23; 0.39]
Hungary	0.31	0.04	6.0%	[0.23; 0.39]
Scotland	0.32	0.04	6.3%	[0.24; 0.39]
England	0.32	0.04	6.1%	[0.24; 0.40]
Poland	0.32	0.04	6.3%	[0.25; 0.40]
Sweden	0.34	0.04	6.4%	[0.27; 0.41]
Finland	0.35	0.05	5.6%	[0.25; 0.44]
Wales	0.36	0.02	7.7%	[0.32; 0.40]
Armenia	0.39	0.05	5.0%	[0.28; 0.49]
Austria	0.41	0.04	6.0%	[0.33; 0.49]
Total (95% CI)	**0.29**		**100.0%**	**[0.25; 0.34]**

Heterogeneity: $Tau^2 = 0.0042$; $Chi^2 = 64.07$, df = 15 ($P < 0.0001$); $I^2 = 76.6\%$

Figure 2. Forest plot. Pooled estimate of difference between adolescents with and without chronic conditions or disabilities (CCD) in *Psychological Complaints* across countries.

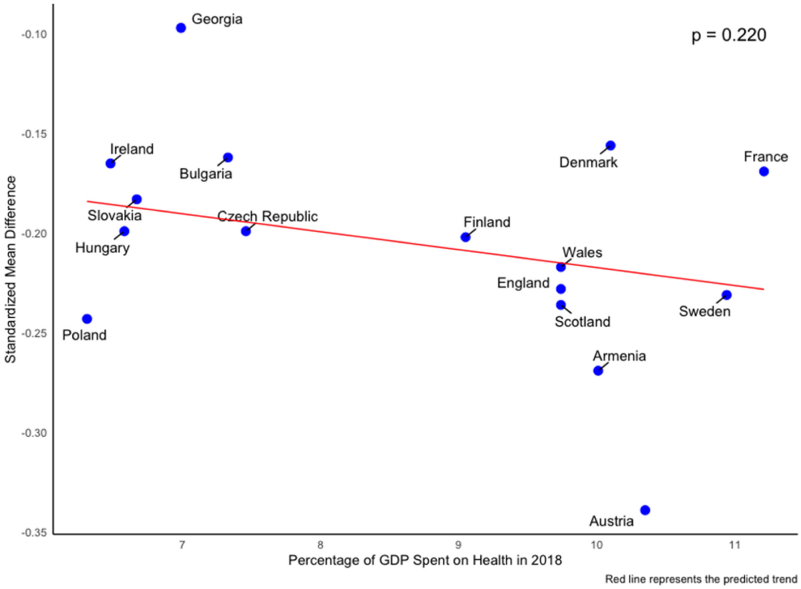
Notes: The vertical line represents the no-difference (effect size = 0) line between adolescents with and without chronic conditions or disabilities (CCD). Values of the right of this line indicate that adolescents with CCD reported more frequent *Psychological Complaints* compared with their counterparts with CCD. The red boxes represent the ES (Hedges' *g*) and the weight of each country, and the horizontal lines represent the 95% CI for each single estimate. The dotted vertical line and the black diamond represent the pooled estimate and its related 95% CI. ES, effect size; SE, standard error, CI, confidence interval, IV, inverse variance.

parts without CCD. Heterogeneity in the data was substantial ($I^2 = 76.6\%$; 95% CI, 62.2% to 85.5%): 62.2% to 85.5% of variation was due to differences between countries rather than sampling error, confirmed again by the between-country standard deviation ($Tau = 0.06$).

Meta-regressions testing country-level moderators

Meta-regressions were conducted to assess the extent to which country-level moderators (percentage of GDP spent on education, percentage of GDP spent on health, and GINI index) influenced the pooled estimate on *Life Satisfaction* (Figures 3a, 3b, and 3c) and *Psychological Complaints* (Figures 4a, 4b, and 4c). Results showed no significant effect of the moderators on the *Life Satisfaction* pooled estimate: GDP spent on health (est. = −0.01; $t = -1.28$; $df = 14$; 95% CI, −0.02 to 0.01; $p = 0.220$), GDP spent on education (est. = −0.01; $t = -0.57$; $df = 14$; 95% CI, −0.03 to 0.02; $p = 0.580$), and GINI index (est. = 0.00; $t = 0.37$; $df = 14$; 95% CI, −0.01 to 0.01; $p = 0.714$). Similarly, results showed no statistically significant effect of percentage of GDP spent on education (est. = −0.00; 95% CI, −0.04 to 0.03; $t = -0.20$; $df = 14$; $p = 0.848$), health (est. = 0.01; 95% CI, −0.02 to 0.04; $t = 0.91$; $df = 14$; $p = 0.379$), and GINI index (est. = 0.00; 95% CI, −0.01 to 0.01; $t = 0.16$; $df = 14$; $p = 0.973$) on the overall *Psychological Complaints* pooled estimate.

a. ***Moderator:*** GDP percentage spent on health in 2018



b. ***Moderator:*** GDP percentage spent on education in 2018

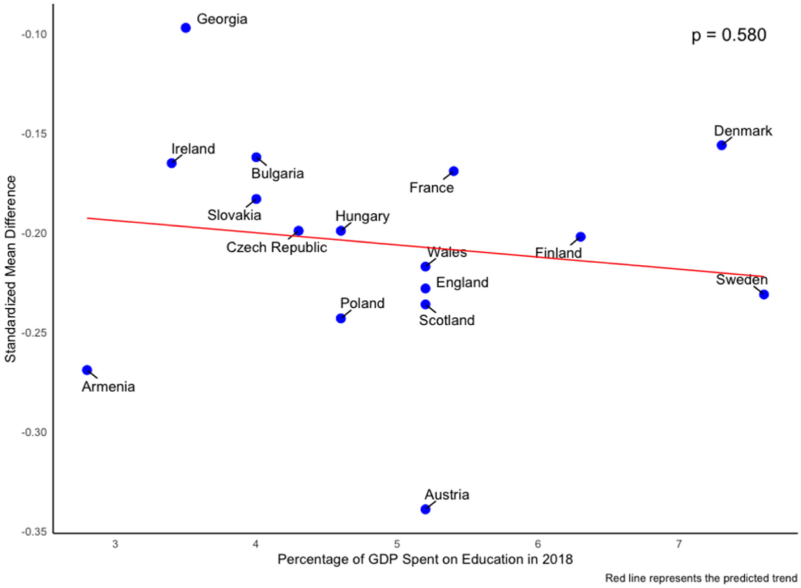
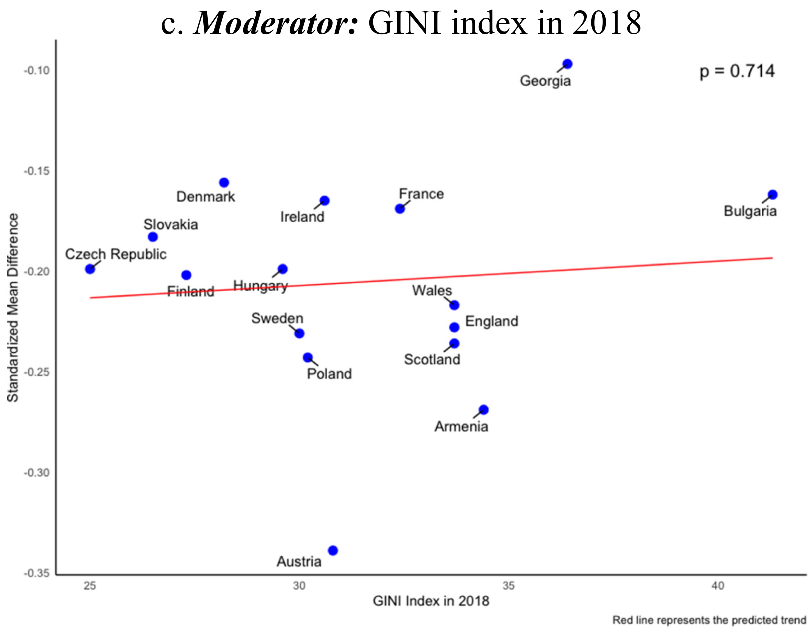


Figure 3. Meta-regression. Differences between adolescents with and without chronic conditions or disabilities (CCD) in *Life Satisfaction* scores by country-level moderators.



c. ***Moderator:*** GINI index in 2018

Red line represents the predicted trend

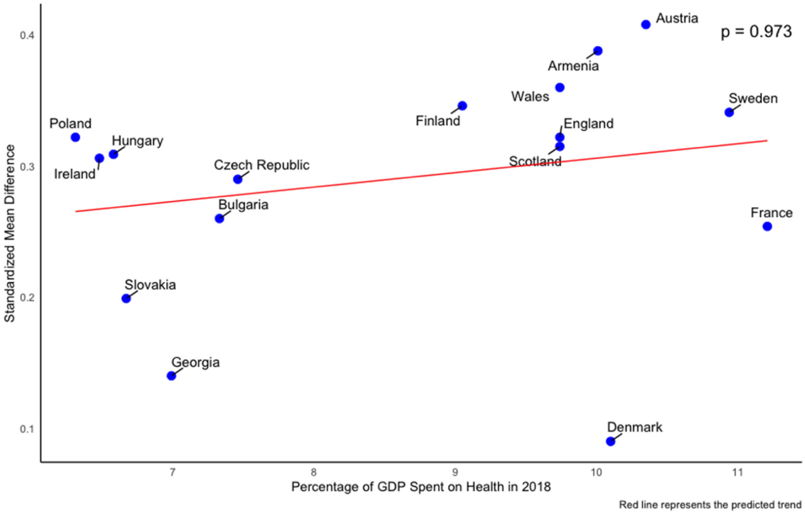
Figure 3. Continued.

Linear mixed-effects model: interaction between family SES and disability status

Figure 5 shows the multivariate statistical analyses regarding the role that family SES plays in explaining differences in *Life Satisfaction* between adolescents with and without CCD within each of the 16 countries (adjusted for sex and age). The results revealed that the interaction between family SES and CCD was statistically significant for Armenia, the Czech Republic, and Ireland. For Armenia and Ireland, the differences between adolescents with and without CCD in *Life Satisfaction* narrowed as family SES increased. By contrast, for the Czech Republic, differences in *Life Satisfaction* between adolescents with and without CCD widened as family SES increased. A meta-analytic approach was also used to investigate the between-country variability of such estimates (Supplementary Figure S1), and results of the meta-analytic approach revealed non-statistically significant differences across the 16 countries (est: 0.02; 95% CI, −0.01 to 0.04; $p = 0.143$).

Figure 6 depicts the multivariate statistical analyses regarding the role that family SES plays in explaining differences in *Psychological Complaints* between adolescents with and without CCD within each of the countries (adjusted for sex and age). Multivariate statistical analyses revealed statistically significant interaction for Armenia, Austria, the Czech Republic, Denmark, and France.

a. ***Moderator:*** GDP percentage spent on health in 2018



b. ***Moderator:*** GDP percentage spent on education in 2018

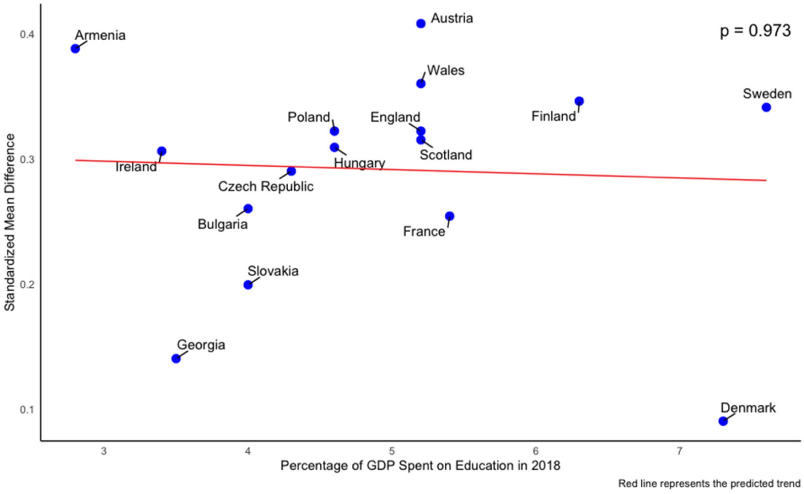
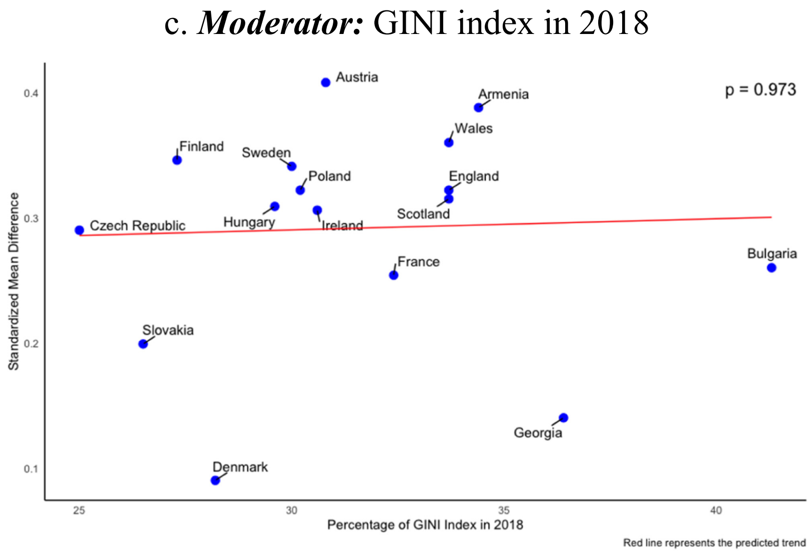


Figure 4. Meta-regression. Differences between adolescents with and without chronic conditions or disabilities (CCD) in *Psychological Complaints* by country-level moderators.

Specifically, for Armenia, Austria, and France, family SES seems to increase the differences between adolescents with and without CCD in relation to *Psychological Complaints*, with the higher the SES, the higher the *Psychological Complaints* differences between adolescents with and without CCD. On the contrary, in Denmark, family SES seems to reduce such differences, with the more affluent the family, the lower the scores in *Psychological Complaints* differences between adolescents with and without CCD. Supplementary Figure S2 shows the results



c. ***Moderator:*** GINI index in 2018

Figure 4. Continued.

of the meta-analytic approach to assess the between-county variability, which revealed non-statistically significant differences across the 16 countries from our study (est: 0.01; 95% CI, −0.00 to 0.03; $p = 0.145$).

Robustness checks

We conducted additional robustness checks using the Family Affluence Scale. Specifically, the variable *IRFAS* was recorded into three categorical SES groups: the lower 20% (representing severe material scarcity), the middle 60% (intermediate affluence), and the top 20% (high affluence). These categories were retrieved using the HBSC protocols (Currie *et al.*, 2008). This nonparametric specification allowed us to examine potential nonlinear associations between SES and mental health among adolescents with CCD and explore whether results differed from the analyses performed with IRFAS as a continuous measure. Results with the categorical measures showed consistent patterns both for *Life Satisfaction* (Supplementary Figure S3) and for *Psychological Complaints* (Supplementary Figure S4), suggesting little variation between the continuous and a categorical approach.

Discussion

This study is, to our knowledge, the first to investigate the micro-macro determinants of adolescent mental health by disability status. Our contribution

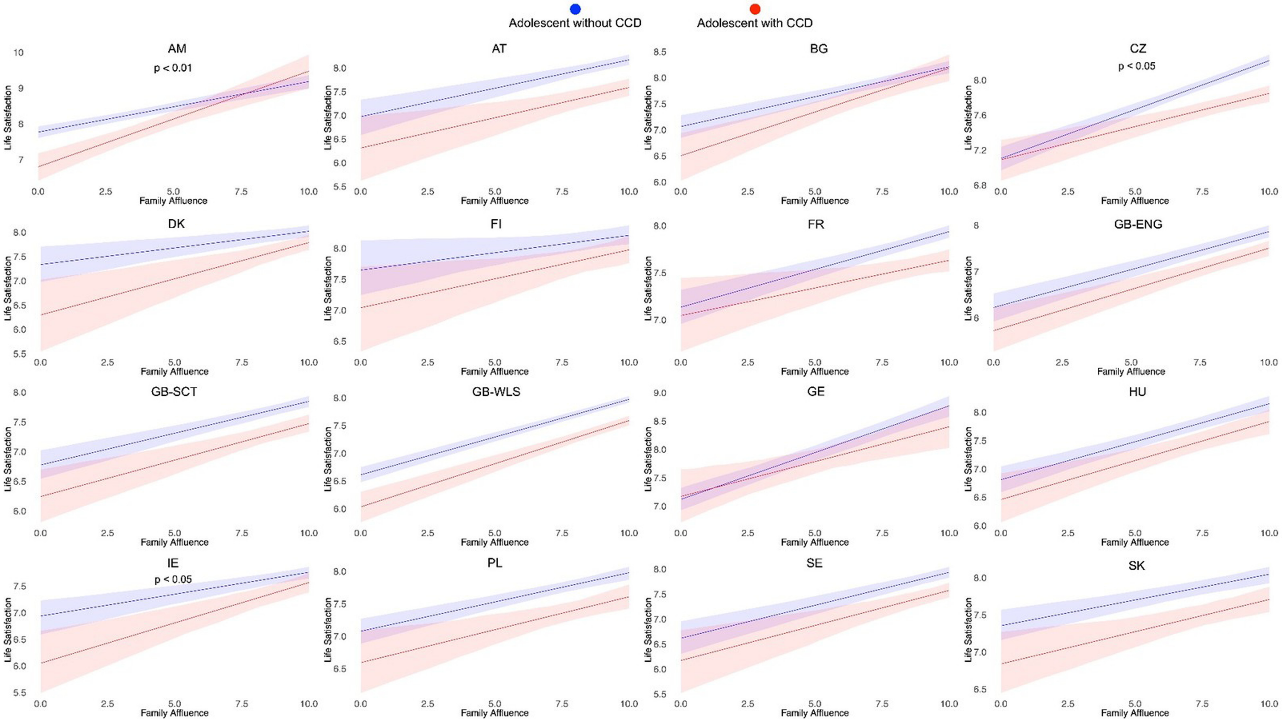


Figure 5. Linear mixed-effects models. Interaction effects of chronic conditions or disabilities (CCD) and family affluence on *Life Satisfaction* across countries.

Notes: AM, Armenia; AT, Austria; BG, Bulgaria; CZ, Czech Republic; DK, Denmark; FI, Finland; FR, France; GB-ENG, England; GB-SCT, Scotland; GB-WLS, Wales; GE, Georgia; HU, Hungary; IE, Ireland; PL, Poland; SE, Sweden; SK, Slovakia; CCD, chronic conditions or disability; Family Affluence Score: the higher the values, the higher the family affluence. The blue line indicates the estimate for adolescents without CCD and the blue area indicates its relative 95% CI. The red line indicates the estimate for adolescents with CCD and the red area indicates its relative 95% CI. All models are adjusted for gender and age.

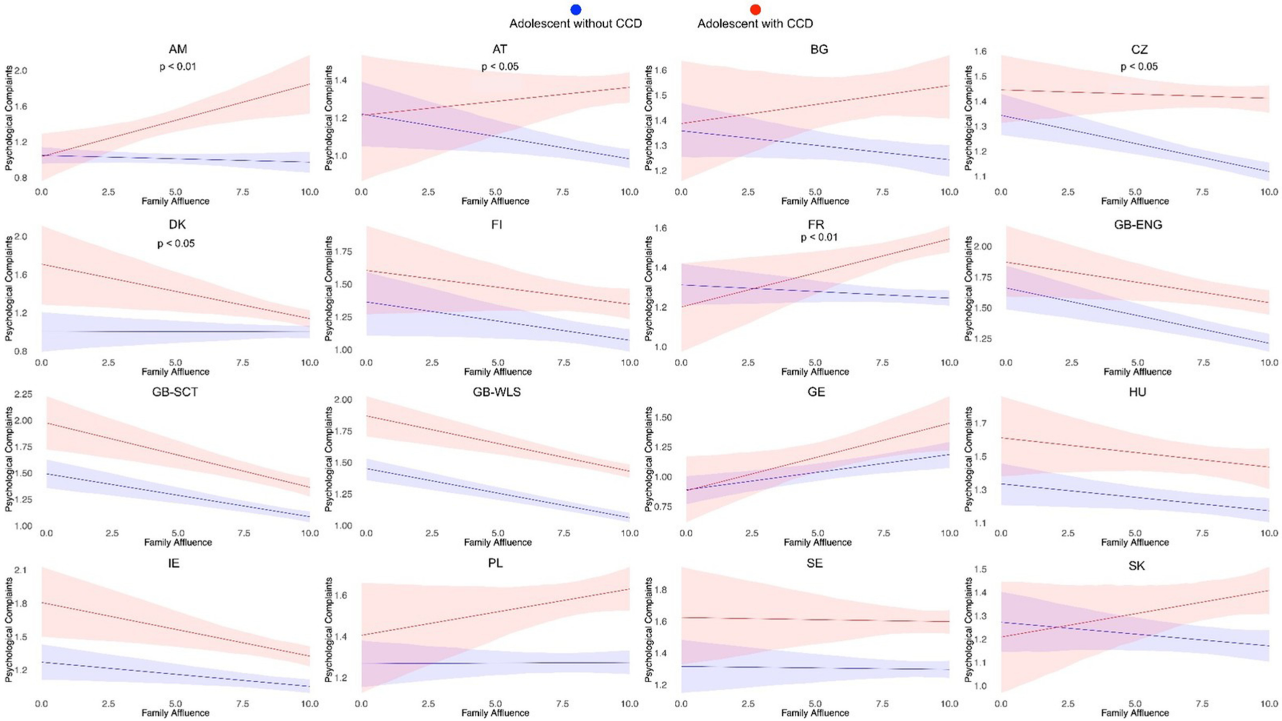


Figure 6. Linear mixed-effects models. Interaction effects of chronic conditions or disabilities (CCD) and family affluence on *Psychological Complaints* across countries.

Notes: AM, Armenia; AT, Austria; BG, Bulgaria; CZ, Czech Republic; DK, Denmark; FI, Finland; FR, France; GB-ENG, England; GB-SCT, Scotland; GB-WLS, Wales; GE, Georgia; HU, Hungary; IE, Ireland; PL, Poland; SE, Sweden; SK, Slovakia; CCD, chronic conditions or disabilities; Family Affluence Score: the higher the values, the higher the family affluence. The blue line indicates the estimate for adolescents without CCD and the blue area indicates its relative 95% CI. The red line indicates the estimate for adolescents with CCD and the red area indicates its relative 95% CI. All models are adjusted for gender and age.

focused specifically on the role of country-level factors and family SES through an intersectional lens. To do so, we analysed large comparable harmonised cross-national data from 16 participant countries in the 2018 Health Behaviour in School-aged Children (HBSC) study and applied a two-step meta-analytic statistical approach. Our study found that adolescents with CCD have poorer mental health than adolescents without CCD in all countries studied. Furthermore, the mental health disadvantage of CCD adolescents did not seem to be moderated by country-level variables (i.e., government health and education spending, and income inequality). Finally, mental health differences between disabled and non-disabled adolescents were not stratified by SES in most countries, with only a few countries showing disability-related mental health gaps across SES groups in various directions.

Our study has several implications for the sociological literature on disabilities, adolescent well-being, and inequalities. First, our findings reinforce existing evidence that adolescents with CCD experience poorer mental health outcomes compared with their peers without CCD, aligning with previous studies that highlighted the heightened risk of psychological distress among children with disabilities (Wolman *et al.*, 1994). Both for *Life Satisfaction* and *Psychological Complaints*, we found disadvantages in adolescents with CCD compared with those without CCD in all national contexts. These findings reflect how adolescents with CCD experience participation restrictions via norms, resources, or institutional designs, which in turn negatively affect their mental health (Mitra, 2006; Shakespeare, 2013). A potential pathway that may explain such differences in school contexts is stigma and structural discrimination around disability. Previous research documents stigmatising attitudes towards disabled students in schools and communities (Ali *et al.*, 2012; Green *et al.*, 2005), which can operate through micro-exclusions (peer rejection, lowered teacher expectations, deficit framing) or institutional practices (gatekeeping for accommodations, fragmented care pathways). These processes may elevate chronic stress, constrain opportunities for belonging, or challenge help-seeking mechanisms associated with higher psychological complaints and lower life satisfaction. Such of disadvantage could also be exacerbated through bullying practices and negative school experiences among adolescents with disabilities in mainstream settings (Rose and Gage, 2017; Schwab, Sharma and Loreman, 2018; Sentenac *et al.*, 2023).

Second, the macro-level factors examined (i.e., percentage of GDP spent on education and health, and income inequality) did not moderate the observed gaps in adolescent mental health by disability status. We anticipated that higher country-level income inequalities would lead to unevenly distributed health benefits, leaving vulnerable groups, and particularly adolescents with CCD, more vulnerable to poor mental health levels. Yet, income inequalities at the country level did not moderate the mental health gaps between adolescents with CCD and those without CCD. Although prior research suggested that increased national investment in health and care services can improve the physical and mental health of marginalised populations, including disabled students (Cook *et al.*, 2015), none of the country-level determinants examined was associated with significant variations in adolescent mental health by disability status. Health and educational programmes oriented to accessibility, affordability, and quality of healthcare and educational services could certainly be beneficial to the well-being of adolescents with CCD. But even if public spending in these areas is beneficial to areas like staffing ratios for school psychologists and nurses, anti-bullying enforcement, accessibility of youth mental health services, and disability rights, total spending in education and health may not effectively capture such specific programmes affecting populations with CCD. Future research should incorporate policy-proximal indicators—for example, coverage of inclusive education supports; legal entitlements to accommodations; waiting times for adolescent mental health services; school climate—to capture the institutional determinants behind the mental health disadvantage of adolescents with disabilities.

Third, our investigation of the interaction between family SES and the mental health of adolescents with CCD revealed different patterns across countries. In most countries, adolescent mental health gaps by disability status were constant across SES groups. In some countries, higher family SES appeared to mitigate disparities in mental health between adolescents with and without CCD (i.e., Denmark, Ireland). This result may suggest that increased resources provide protective factors to enhance overall mental health, which is in line with other research on adolescents and adults (Sareen *et al.*, 2011; Savage *et al.*, 2020). By contrast, in some other countries, higher family SES seemed to widen disparities between CCD and non-CCD adolescents (i.e., Austria, the Czech Republic, France). This finding could indicate that being in higher-SES positions amplifies awareness of health-related risks, while the advantage of higher-SES families is particularly suited to non-disabled groups, which leaves high-SES adolescents with disabilities with a situation that is relatively closer to that of adolescents from disadvantaged SES backgrounds. The following motivates attention for future research: (a) In most countries, disabilities and SES did not show a meaningful interaction in line with expectations from previous studies (Chatzitheochari, Velthuis and Connelly, 2022; Parsons and Platt, 2013). (b) The countries where SES and disabilities intersected effectively do not seem to share clear policy or cultural features.

The findings of our study contribute—theoretically and empirically—to sociological debates on health and well-being inequalities among adolescents with CCD and their families. Consistent with previous literature and expectations

(Downs *et al.*, 2018; Rydzewska *et al.*, 2019; Sentenac *et al.*, 2023), adolescents with CCD showed lower mental health than adolescents without CCD across contexts. Critically, the observed small and mixed role of macro-level and micro-level socioeconomic inequalities in the association between disability status and adolescent mental health across societies suggests that social inequalities and disabilities relate to each other in complex ways regarding adolescent mental health. While gaps in mental health by disability status displayed different magnitudes across countries, macro-level and family-level measures of income and socioeconomic inequalities did not moderate the association between CCD and adolescent mental health. Given the limited sociological research using a cross-national approach to investigate mental health disparities between disabled and non-disabled adolescents, we hope our study will serve as a valuable tool to further research on this pressing issue within the social sciences. Future research should examine more carefully the patterns underlying cross-national differences in adolescent mental health by CCD that we found, as our data cannot disentangle some specific mechanisms driving the observed variations across countries.

Our study has some limitations that warrant consideration in terms of both conceptualisation and measurement. First, the HBSC measure of CCD aggregates heterogeneous health conditions under a single indicator. Although this operationalisation is well established in cross-national research, it may involve some degree of underreporting and overreporting. Underreporting may occur for less visible or later-diagnosed conditions (e.g., neurodevelopmental or learning-related conditions), while overreporting may reflect socioeconomically patterned access to healthcare, diagnosis, and health-related knowledge across families. Accordingly, findings—particularly those involving family SES gradients—should be interpreted as capturing both differences in underlying health status and social processes related to diagnosis, recognition, and reporting. Second, the fact that the HBSC samples adolescents in mainstream schools implies that the CCD group likely captures a broad range of mild to moderate conditions, rather than the full severity spectrum. This fact may potentially contribute to relatively modest effect sizes across countries. Third, there are currently no quantitative indicators of macro-level inclusiveness or policies targeting disabled youth that we could employ. While the Berkeley Index (Menendian, Elsheikh and Gambhir, 2020) is a relevant country-level indicator, the data collection year of our study is unfortunately too far in time from the available waves of the Berkeley Index. Finally, the FAS measure primarily captures material living conditions and does not fully encompass other dimensions of socioeconomic advantage, such as cultural or institutional resources, which may play an additional role in shaping disability-related mental health outcomes.

Despite the limitations, this study makes important contributions to the literature. Our study is the first to systematically investigate the differences between adolescents with and without CCD in mental health outcomes (*Life Satisfaction* and *Psychological Complaints*) across micro and macro contexts. In this way, this study provides a novel approach in the field with a systematic micro-macro framework that benefits from a two-step meta-analytic design, using large cross-country comparable data. We hope future studies will apply similar designs to further address the micro- and macro-level determinants of mental health inequalities among adolescents with disability conditions.

AI use disclosure

The authors disclose that no AI tools have been used in the preparation of this manuscript.

Data and code availability

Data and codes used for the analyses in this article can be downloaded at the following link: https://drive.google.com/drive/folders/12aqELxqFVMGlmCpflSza1GgUszdmPLJT?usp=share_link.

Declaration of interest statement

All authors declare that they have no conflicts of interest to disclose.

Ethical approval

Ethical approval was not applicable for this manuscript. Data were collected as part of the Health Behaviour in School-aged Children project and made available on their website.

Supplements

Supplementary material for this article can be accessed online at https://doi.org/10.1162/EUSO.a.99.

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