

WELL-ED: Wellbeing and Education linkages in school-aged children - A protocol for a population-based register study and survey of adolescents

Silja Kosola^{1,2}, Sanna Salonen^{1,3}, Jenni Miettinen¹, Iiris Hörhammer⁴, Anna-Riikka Impiö¹, Satu M. Kumpulainen^{1,2}, Johanna Sergejeff⁵, Saija Numari⁶, Pirjo Laitinen-Parkkonen^{2,6}, Maria Tapola-Haapala⁷, Elina Aaltio⁸, Lena M. Thorn^{3,9}

¹ Western Uusimaa Wellbeing Services County, Finland

² Clinicum, University of Helsinki, Helsinki, Finland

³ Department of General Practice and Primary Health Care, University of Helsinki and Helsinki University Hospital, Helsinki, Finland

⁴ Department of Health and Social Management, University of Eastern Finland, Kuopio, Finland

⁵ Faculty of Education and Psychology, University of Jyväskylä, Finland

⁶ Wellbeing Services County of Central Uusimaa, Finland

⁷ Wellbeing Services County of Päijät-Häme, Finland

⁸ Faculty of Social Sciences, Tampere University, Tampere, Finland

⁹ Folkhälsan Research Center, Helsinki, Finland

Short title: **Wellbeing and education linkages in school-aged children: study protocol**

Abstract

NOTE: This preprint reports new research that has not been certified by peer review and should not be used to guide clinical practice.

28 Introduction

29 Education is a core social determinant of health for children and adolescents. Unfortunately,
30 academic achievement, health, and wellbeing of adolescents have decreased in many developed
31 countries in the past decade. The purpose of the Wellbeing and Education linkages in school-aged
32 children (WELL-ED) study is to examine associations of school absences and academic
33 achievement with use of school-based and community-based health and social welfare services. In
34 addition, we will assess user experiences and multi-sector services pathways of school-aged
35 children for a better understanding of how the service system could respond to the needs of
36 children.

37 Methods and analysis

38 WELL-ED is a large population-based study that combines register data on school absences and
39 educational support from municipalities with register data on healthcare and social service use
40 collected from wellbeing services counties in Finland. The study cohort includes all children who
41 attended mandatory education in public schools in Southern Finland in school year 2023-2024. A
42 smaller cohort of adolescents in school year 8 was invited to complete a user experience survey.
43 The primary outcomes of this study are related to equity of service use.

44 Ethics and dissemination

45 The Regional Committee on Medical Research Ethics of the Helsinki and Uusimaa Hospital District
46 (2803/2024) has approved the WELL-ED study protocol. For the survey, adolescents in year 8 and
47 parents of adolescents younger than 15 provided informed consent. Results will be published in
48 peer-reviewed journals, summaries will be sent to participating municipalities and wellbeing
49 services counties and press releases will be written on key findings.

50

51

52 Introduction

53 Education, health, and wellbeing are closely intertwined. Education is strongly associated with
54 health behaviours and life expectancy, and it may be considered one of the most important social
55 determinants of health (1). To ensure students have the best possible opportunities for learning,
56 more than 100 countries provide some form of school health services (2). The World Health
57 Organization (WHO) and the United Nations Educational, Scientific and Cultural Organization
58 (Unesco) have recognized the close connections of health and education and published several
59 guideline documents to support the concept of health promoting schools (3).

60 Although many European countries provide free or subsidised education and health and welfare
61 services to their children, recent years have seen increasing differences in academic achievement,
62 health, and wellbeing among children and adolescents (4-6). The socio-economic status (SES) of
63 the family bears more weight in education than before even in the Nordic countries which have
64 previously been beacons of equity (7). In schools, especially absences due to illness are an
65 increasing problem and teachers have very limited opportunities to intervene in them (8-10).
66 Although school absences are associated with a lower educational level and poorer health in
67 adulthood, systematic records on school absences and interventions to overcome them are still
68 often lacking (11).

69 Increasing polarisation is also evident in health behaviour among adolescents: although binge
70 drinking and smoking have decreased on a population level, socio-economic disparities in risky
71 behaviour have increased (5, 12, 13). Furthermore, nearly all developed countries have witnessed
72 a rise in mental health symptoms reported by adolescents. This rise began already prior to the
73 COVID-19 pandemic, was exacerbated by social distancing measures, and has shown no signs of
74 decline (14). Tackling polarisation and responding to adolescent mental health problems call for
75 more targeted approaches, but concurrent, universal health promotion measures are also needed.

76 In Finland, a social and healthcare service reform of historical proportions was undertaken in 2023
77 and gathered all social and healthcare services from more than 300 municipalities to 21 wellbeing
78 services counties, while the city of Helsinki and Åland Islands are exceptions and organize their
79 own services (15). Most true reforms, such as service redesign and integration, are still

80 forthcoming. For example, a recent study supported the hypothesis that the concerns of teachers,
81 parents and school nurses regarding primary school students are associated with the need and
82 benefit of a consultation with a school physician (16), but no mechanism is in place to notify school
83 healthcare providers of school absences or other concerns to ensure informational continuity of
84 care (17).

85 In a critical assessment of school healthcare services in Finland, the evidence-base was modest.
86 Some studies have estimated the benefits and potential harms of routine health checks conducted
87 by school physicians in school years 1 and 5 (18), but no studies have targeted routine health
88 checks in year 8. Furthermore, little is known about the health needs and access to services of
89 children in other year levels at school. Meanwhile in child protection services, the proportion of
90 adolescents in care began to increase before the pandemic and has shown no decline (19, 20). In
91 many instances, child protection services have become the first point of contact although this
92 position should belong to preventive and supportive family services. To increase effectiveness and
93 to reduce inequities, policies and healthcare and welfare services should address structural and
94 interpersonal discrimination that may further exacerbate socio-economic inequity (21). To date, no
95 regularly measured quality indicators exist for service pathways of children and adolescents.

96 Researchers across disciplines have called for collaboration in research and development between
97 professions and organisations because preventing social exclusion or finding solutions to help
98 students with excessive school absences is impossible without cooperation of education,
99 healthcare and social work professionals (8, 22). In an era of aging populations and decreasing
100 birth rates, research combining these fields is of paramount importance.

101

102 **Study aims and hypotheses**

103 The primary aim of this population-based study is, for the first time globally, to combine data from
104 school administrative records with data on healthcare and social care service use to provide a
105 holistic view of service use patterns and pathways for school-aged children. We also aim to

106 estimate the needs, benefits and potential harms of routine health checks from the perspective of
107 adolescents in school year 8.

108 More specifically, we aim to:

- 109 1. Measure the prevalence of school absences and sociodemographic and educational factors
110 associated with them
- 111 2. Assess how well school healthcare services target students with problematic school
112 absences (more than 10% of school year) or students in need of pedagogical support
- 113 3. Evaluate equity in healthcare and social service use based on the socio-economic area of
114 the school
- 115 4. Map the multi-sector service pathways that start in school healthcare and wellbeing
116 services, identify pathway discontinuities and propose quality indicators for them
- 117 5. Report experiences of care of students in school year 8 who have attended routine health
118 checks with a school physician.

119 Our primary hypotheses are that 1) the prevalence of excessive school absences increases along
120 with student age and that SES is associated with absences; and that 2) school healthcare service
121 use has low correlation with school absences and demographic variables. Furthermore, we
122 suspect that the care pathways of school children across student wellbeing services and social
123 care services show room for improvement.

124

125 **Methods and analyses**

126 **Study design and setting**

127 The Wellbeing and Education linkages in school-aged children (WELL-ED) Study was designed
128 together with representatives from the eight wellbeing services counties in Southern Finland (City
129 of Helsinki and Wellbeing Services Counties of Central Uusimaa, East Uusimaa, Kymenlaakso,
130 Päijät-Häme, South Carelia, Vantaa and Kerava, and Western Uusimaa).

131 In Finland, compulsory education begins the year a child turns seven years and more than 95% of
 132 children attend public schools. The first nine years of education follow a fairly uniform national core
 133 curriculum of basic education (23), with some locally weighted content, whereafter students enter
 134 secondary education where they choose either academic high school or vocational education.
 135 Assessment of academic achievement using numeric grades usually begins in the fourth year of
 136 basic education. In Finland, grades for school subjects range between 4 (fail) to 10 (excellent), with
 137 8 (good) defined as generally reaching the set target for the school year (24). All municipalities use
 138 electronic school administration systems to track school absences, but no national register or
 139 system for follow-up of trends exists. Furthermore, no routine is in place for sharing school
 140 absence data with school healthcare providers.

141 During the nine-year basic education, wellbeing services counties are legally required to organize
 142 student health and wellbeing services (25-27). These services include mandatory annual health
 143 checks by a school nurse and three health checks by a school physician in school years 1, 5, and
 144 8 (at ages 7-8, 11-12 and 14-15 years, respectively). The Finnish Supervisory Agency follows that
 145 the wellbeing services counties conduct the health checks as expected. Besides the health checks,
 146 school healthcare should also provide additional consultations based on the special needs of the
 147 students, but no systematic measure exists for this responsibility. In addition to school healthcare,
 148 the student health and wellbeing team must include school counsellor and school psychologist
 149 services. The primary aim of these services is to ensure a safe and inclusive school environment,
 150 but both professionals also meet individual students.

151 After ethics approval from the HUS Regional Committee on Medical Research Ethics (2803/2024),
 152 we applied for research permits from the eight wellbeing services counties and the corresponding
 153 50 municipalities of Southern Finland. All wellbeing services counties and 38 (76%) municipalities
 154 granted permission to conduct the study. In all, register data of 188,016 children aged 7-15 (90% of
 155 the respective age group in the study area and 36% of the respective age group in Finland) are
 156 included in the study (please see Figure 1).

157 **Figure caption: Figure 1. Flowchart of register data collection.**

158

159 Register data

160 Individual-level register data for the school year 2023-2024 were derived from the electronic school
161 administration system Primus used by municipalities and the different electronic client and patient
162 records of the wellbeing services counties (Table 1). Similar data from client and patient records
163 will also be collected for the school year 2024-2025 to enable more in-depth analysis of service
164 pathways and longitudinal analyses of service efficacy. This data collection is expected to be
165 completed by August 2026.

166 **Table 1. Data collected from municipalities (school data) and wellbeing services counties**
167 **(healthcare and social services).**

Register data from schools	Register data on healthcare and social services
Pedagogical support	Birth year and month
<i>General (including minor learning problems)</i>	Official sex
<i>Intensified (specified problems)</i>	Municipality of residence
<i>Special (special needs education)</i>	Home language
Academic achievement	Diagnoses
<i>Grades in mother tongue</i>	School healthcare and wellbeing services
<i>Grades in mathematics</i>	<i>Dates and number of school nurse visits</i>
School absences	<i>Completed mandatory health checks</i>
<i>Total number of hours per school year</i>	<i>Additional consultations with school physician</i>
<i>Unexcused</i>	<i>Meetings with multidisciplinary school health team</i>
<i>Absences due to illness</i>	<i>Referrals to other healthcare and wellbeing professionals</i>
<i>Other excused absences</i>	Primary healthcare outside of school
	<i>Consultations with nurse</i>
	<i>Consultations with physician</i>
	<i>Consultations with physiotherapist</i>
	<i>Consultations with nutrition therapist</i>
	<i>Emergency department visits</i>
	<i>Use of mental health services</i>
	Social services, if service provided with child as client
	<i>Family counseling</i>
	<i>Family social work</i>
	<i>Social guidance</i>
	<i>Child protection services</i>

168

169 *Data on pedagogical support, school grades, and school absences*

170 All public schools of all municipalities in Southern Finland use the same school administration
 171 system, Primus (Visma Software International AS), to record pedagogical support and school
 172 grades, and to track school absences. We collected data on educational support, school grades in
 173 mathematics and Finnish/Swedish (depending on which of the two national languages the students
 174 studied as their mother tongue or primary language at school), and school absences. In the school
 175 year 2023-2024, pedagogical support was based on a three-tiered system: 1) general support for
 176 all students, including students with minor learning problems, 2) intensified support for specified
 177 problems, and 3) special support or special needs education (28). Grades in mother tongue and
 178 mathematics were dichotomized: grade 7 or lower indicated that a student was not achieving the
 179 goals set for the respective school year. Teachers mark absences into the system using three
 180 different codes: absent with permission from parents/guardians (e.g. illness or family vacation),
 181 absent with permission from school (e.g. participation in tutoring), or absent without permission. In
 182 the last case, a notification is sent via the Primus digital user interface to the parents/guardians
 183 who have the possibility to mark the absence as excused due to illness or to leave it
 184 unexplained/unexcused. Some municipalities only record the total amount of absences without
 185 distinction between absence types, whereas others categorize absences as unexcused absences
 186 (also known as truancy), illness absences, and other excused absences. We collected both the
 187 total hours of absences for the school year, and when available, the hours of absences in the three
 188 categories (unexcused, illness absences, and other excused absences). To facilitate comparisons
 189 between different age groups, we will calculate two variables based on the national core curriculum
 190 (28): whether a student was absent for more than 10% of the school year, which is often
 191 considered a threshold for problematic school absences (29), and whether a student was absent
 192 for more than 20% of the school year, indicating a risk of educational dropout.

193 *Healthcare and social services data*

194 At baseline (2023-2024), most of the participating wellbeing services counties of Southern Finland
 195 provided primary healthcare (but no hospital care) and social services. They used ten different

196 client and patient record systems, and data retrieval had to be tailored to each one. The retrieved
 197 healthcare data included the following: national personal identification code (unique code provided
 198 to each individual after birth or if a legal resident has grounds for registration), birth year and
 199 month, official sex, municipality of residence, home language, all diagnoses, dates of visits to the
 200 school nurse, completed mandatory health checks, additional consultations with the school
 201 physician, possible meetings of a multidisciplinary health and wellbeing team, referrals to another
 202 health and wellbeing professional; and outside of schools in the public healthcare centres,
 203 consultations with a nurse, physician, physiotherapist, or nutrition therapist; emergency department
 204 visits, and treatment at mental health services. From social service records, we collected data on
 205 service use in family counselling, family social work, social guidance, and child protection services,
 206 if services were provided based on the child as a client.

207

208 School socioeconomic area

209 In Finland, municipalities are primarily responsible for organizing compulsory education, and only
 210 3-5% of Finnish students attend private schools during basic education (30). Because collection of
 211 household income data is inconceivable in this study, we will gather information on the
 212 socioeconomic area of the schools from Statistics Finland (40). A school-area index of
 213 socioeconomic disadvantage (SEI) combines three indicators at the postal code level: 1) the
 214 proportion of households belonging to the lowest income category, proportion of 25-64-year-old
 215 residents without secondary education, and the unemployment rate among residents aged 16-64.
 216 These indicators are summed and thereafter their mean is calculated. The sum index is
 217 proportional to the average of the municipality or wellbeing services county with the value 100
 218 representing the average score. A value above 100 indicates that the SES of the postal code area
 219 is below the municipality average and a value below 100 implies that SES is above the municipality
 220 average. This index has previously been used by the Urban Research and Statistics Unit of the
 221 City of Helsinki.

222

223 Data archive and management

224 After retrieval, all register data will be transferred to HUS Acamedic, an audited, secure processing
225 environment for the study of sensitive social and healthcare data. The environment is accessible to
226 registered research group members via a web browser. Due to the Act on the Secondary Use of
227 Personal Data, eight separate data processing environments were created for the WELL-ED
228 dataset, one for each health and wellbeing services county.

229 A data manager combines data from Primus and the different client and patient records using the
230 unique personal identifier. After completing data combinations, all datasets are pseudonymized
231 using a separate key. Researchers only have access to pseudonymous datasets.

232

233 Survey data

234 *Eligibility criteria*

235 Inclusion criteria for the adolescent survey were that they: were at least 15 years old (according to
236 Finnish research legislation, 15-year-olds can consent to participate in survey studies without
237 parental consent), or if they were younger, parents provided consent; had attended a routine health
238 check conducted by a school physician or had been offered one; attended one of the participating
239 schools; and spoke at least one of the languages (Finnish, Swedish, English, Estonian, Russian,
240 Arabic or Somali; most common home languages in the study area) in which the study survey was
241 available. Surveys were translated by professional translators.

242 *Sample size and power calculations*

243 To ensure sufficient sample size, we conducted two power calculations, one for binary and one for
244 continuous measures. First, we wished to detect small-to-moderate differences in binary outcomes
245 (absolute differences of approximately 8-10 percentage points, corresponding to odds ratios of
246 roughly 1.4-1.6) with 80 % power ($\alpha = 0.05$, two-sided). For continuous outcomes, we wished to

247 detect small, standardized effect sizes (Cohen's $d = 0.20$). For both assumptions to be true, we
248 would need a sample size of 800 participants. Considering the common recruitment rate of 30%
249 among the target age group, we aimed to contact 2700 adolescents.

250 *Participant recruitment*

251 After ethics approval, we contacted 37 schools of which 19 agreed to participate. Three members
252 of our study group visited the schools between August 15 and October 10, 2025, and provided
253 year 8 students with both written and oral information about the study. Information was also
254 available as short videos in the study languages. Participation was completely voluntary, and
255 students were allowed to respond to the study survey during school hours. Surveys were available
256 via QR codes in the seven different languages and responses were collected via Research
257 Electronic Data Capture (REDCap), a secure digital survey tool provided by the University of
258 Helsinki, Finland.

259 *Survey content*

260 The Patient Enablement Instrument (PEI) is a validated six-item, patient-reported outcome tool that
261 evaluates a patient's ability to understand, manage and cope with their condition after a
262 consultation (32). It has been validated as a quality measure in primary healthcare in several
263 countries, including Finland and Sweden (33, 34). Total PEI scores thus range from -6 to 12 or 0 to
264 12, respectively. We found no previous studies using PEI in adolescent populations.

265 In addition to the PEI, the survey included several binary items (e.g. "Prior to the meeting with your
266 school doctor, did you have any issues you wished to discuss?") as well as space for open
267 responses.

268

269 *Analysis plan*

270 Due to data protection regulations, all statistical analyses will be conducted separately for each of
271 the eight wellbeing services counties and then combined and compared in meta-analyses.

272 We will adhere to the Strengthening the Reporting of Observational Studies in Epidemiology
 273 (STROBE) when reporting quantitative findings. Demographic and descriptive categorical data will
 274 be reported as numbers and percentages, and continuous variables as means with standard
 275 deviations (SD), or in case of skewed distribution, medians with interquartile ranges (IQR).
 276 Pearson and Spearman correlations will be calculated for binomial associations as appropriate.
 277 Multivariable regression analyses and mixed-effects models will be conducted, and data will be
 278 clustered according to municipality and schools, when appropriate.

279 ORs will be calculated to estimate the predictive value of age, home language, need for
 280 pedagogical support, and absences on appointments with school physicians and other school
 281 health and wellbeing professionals. To study the volume, frequency, and sequence of service use
 282 in the health and wellbeing service system, Sankey diagrams will be used to explore the flow of at-
 283 risk children across different social and healthcare settings and to probe suggestions for multi-
 284 sector quality indicators from the sector experts. Regression analysis will be used to identify
 285 statistical differences in service trajectories between sub-groups. To propose system-level quality
 286 indicators sensitive to resource allocation, cost estimates will be assigned to service use. Standard
 287 national cost estimates will be used where available and complemented by local estimates as
 288 needed.

289

290 Patient and public involvement

291 The WELL-ED study design was cocreated with staff from all participating wellbeing services
 292 counties who also named a member to the steering group.

293 The survey for year 8 students was developed together with the Youth Research Council (YRC) of
 294 the New Children's Hospital, which is part of the Helsinki University Hospital, Finland. The YRC is
 295 composed of nine voluntary adolescents, aged 15-17 years, who have been trained to serve on the
 296 YRC. The only fixed element of the survey was the PEI, some other questions were presented to
 297 the YRC as rough drafts and sent to the YRC two weeks before their meeting. Two researchers

298 participated in the meeting with the YRC. The researchers mostly listened to the YRC members
 299 discuss the comprehensibility and content of the survey but also responded to questions from the
 300 YRC. The YRC was satisfied with the final survey and especially highlighted their support for the
 301 study subject, experiences of care of young people.

302

303 **Ethics and dissemination**

304 The WELL-ED study conforms to the Declaration of Helsinki. The Regional Committee on Medical
 305 Research Ethics of the Helsinki and Uusimaa Hospital District approved the study protocol
 306 (2803/2024). For use of the register data, research permits were acquired from each participating
 307 organization and municipality. For the survey, adolescents and their parents/guardians received
 308 both verbal and written information on the purpose of the study. In Finland, adolescents aged 15 or
 309 older may give consent to participate in survey studies without approval from their parents. No
 310 compensation was provided for study participants.

311 Study results will be presented at scientific meetings and published in international, peer-reviewed
 312 journals, with a preference for open-access publication. After publication, summaries of study
 313 results will be disseminated via the research project's website, the steering group, and participating
 314 municipalities. News media will also be notified.

315 In the coming years, we aim to build a curated repository of the WELL-ED register data together
 316 with researchers from the University of Turku, Finland. This repository will be stored in the FIONA
 317 remote access system, a secure environment for processing research data provided by Statistics
 318 Finland.

319

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431

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437

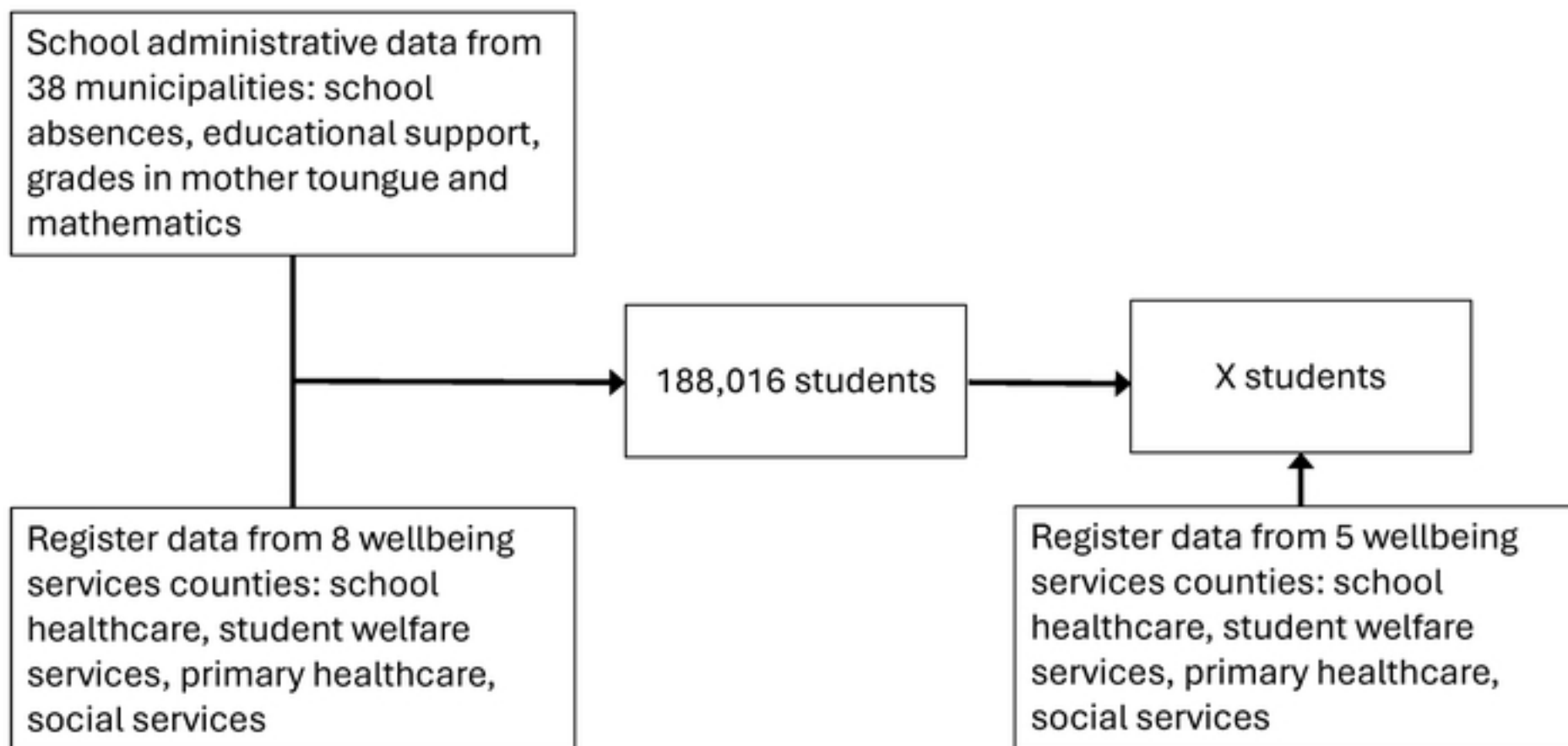
438 **Competing interests statement**

439 None declared.

440

School year 2023-2024

School year 2024-2025



Figure