Research Plan – BE-TEEN

The pedagogic school environment, academic achievements, life-style and mental health in adolescence- A longitudinal study.

1. Specific objectives and aim of the proposed research program

1.1 Overarching aim

This research program sets out to assess the short-term effects of school environment, academic achievements and life-style on the mental health of adolescents. We will conduct a large scale longitudinal study, using surveys at the school, class, parent and student levels and information from health-registers.

1.2 Primary objectives

The following core questions will be addressed:

1.2.1 The association between the school pedagogic environment and its specific dimensions (e.g. pedagogic leadership, teaching methods, relations in school) and the risk of mental ill-health and of psychiatric disorders in adolescence.

1.2.2 The association between life-style and subsequent onset of mental ill.

1.2.3 A comparison of the pattern of these associations between the Italian and Swedish context.

1.3 Additional objectives

The feasibility and effectiveness of a screening for early detection of mental health problems among adolescents; the costs of mental illness among school students; the interaction between school- and family-level social and psycho-social factors and mental ill-health.

2. Background

In adolescence, school is a key environment in which developmental milestones such as learning [1] and socialization [2] take place. Successful learning and academic achievements are the results of a complex set of determinants, related to the student him/herself, family, school environment, and teacher as well as the teaching style, and subject curricula [3]. Besides a recognized association between academic achievement and child/youth mental health [4] school performance seems to be intimately linked to health in a lifelong perspective and changes in school performance can influence health into adulthood [5]. Recent studies among young adults also show exceptionally strong and graded negative associations between compulsory school leaving grades and suicide [6] as well as hospitalization due to self-inflicted injury [7]. Such associations were independent of parental social disadvantage, education and psychiatric history. School failure may be causally linked to mental ill-health via labor market exclusion or expectations of such exclusion, particularly in a modern information economy [8]. Another potential key mechanism is loss of self-esteem due to failure and resulting emotional distress [9]. However, there is also strong evidence for the reverse causal relationship between school performance and mental health, i.e. that internalizing and externalizing mental health problems may negatively influence academic achievement [4]. Finally, school failure and mental distress may share common determinants such as genetic factors, adverse perinatal events, childhood adversity and low cognitive competence[4]. Because of the multiple pathways involved, a singular focus is sometimes placed on what children bring with them when they enter schools (e.g., children’s social background) rather than on school environment or the complex interaction between multiple influences. As a consequence, the relation between school pedagogic environment and mental health is insufficiently investigated. Such knowledge is greatly needed since there is
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evidence of increasing rates of internalized problems, especially in older teenage girls and young adults from the 1980s until today [10] [11]. Considering the evidence for a meaningful connection between the ecology of schools, mental health, and achievement, some studies have shown that academic progress and indicators of adjustment – like disruptive classroom behavior – significantly vary at the school-building level above and beyond the contribution made by individual and family level factors [12]. Other studies have shown that aspects of schools, such as poor school climate, can act as risk factors for youth mental health, but also as protective factors that mitigate the influence of other individual level risks [13]. In an American short-term longitudinal study early/middle adolescents who perceived friction in their schools were more likely to experience internalizing and externalizing problems a year later [14]. In another study, the school social climate was found to work as a protective factor that buffered the effects of individual level risks (e.g., destructive forms of self-criticism) on later internalizing and externalizing problems [15]. The function of school climate as a risk or protective factor is likely connected to how school climate is variably conceptualized and measured across studies [16, 17]. Due to differing conceptions of school climate it is also important to explore how specific aspects of this construct may relate to child/adolescent mental health. In particular, the roles of organizational as well as of educational factors, such as teaching methods, curriculum characteristics, assessments and evaluation system deserve attention [4].

We therefore aim to address questions on which specific aspects of a school environment may be strengthening or detrimental for adolescents’ mental health.

3. Project description

We will establish an Italian cohort of 14-15 years old students, enrolling about 1000 teenagers attending the first year of secondary school in a sample of schools located in Brescia province (modal age 14 years). A letter will be sent to all the public and private schools located in Brescia province asking for participation in the project. We expect a participation of about 50% of the schools. Some meetings with school personnel, students and students’ parents will be organized for explaining the aims and methods of the project.

The 14-years old students attending the participating schools will be considered eligible for the study. Exclusion criteria will include: severe learning disabilities, poor knowledge of the Italian language and lack of parents’ signed consent. A complete description of the project, of the data collection methods, data use and ethical aspects will be provided to parents by specific meetings. During these meetings, we will ask parents to sign the consent form. Subsequent contacts with families will be established by the study team also using e-mail and phone. Students’ questionnaires will be administered at school whereas parental questionnaires will be sent them home or by e-mail. Before the start of the study we will sort out a pilot study in a sample of 100 students to evaluate the methodology that we will use. After this initial phase of the study (cross-sectional survey), the students and their parents will enter the longitudinal phase of the research for subsequent 4 years.

3.1 Data collection

We will use the same tool of the Swedish Kupol cohort (http://kupolstudien.se/). We will employ a multi-level and multi-method data collection as described in details below, with surveys at the school, class, family, and student level. Self-reports will be complemented via record-linkages with administrative registers.

3.1.1 Measurement of primary exposure and other school characteristics
Teacher and student perception of the culture, climate and ethos of schools can be formally investigated and combined in a score denominated PESOC (Pedagogical and Social Climate of a school) (Attachment 1A and Attachment 1B). Factors that have been associated to a high PESOC score (i.e. most effective schools) in previous studies are, among others: clear and strong pedagogic leadership, teachers’ participation and cooperation, high expectation about students’ achievements combined with encouragement and reward for students’ performance, clear norms and sanctions, flexibility and interactivity of teaching, regular contacts between school and families [18].

The instrument for teachers consists of a questionnaire containing 95 statements (Attachment 1A), while the instrument for students contains 57 statements (Attachment 1B). The statements refer to 13 factors among those associated with an effective school environment listed above. Agreement with the statements is given using a four-point Likert scale.

Procedure: All teaching personnel in the selected schools will be eligible for the PESOC survey. Among students, only those attending the 2nd-3rd year will be eligible, because they have the longest experience of the school as an organization. In other words, with exception for the last year in school, the ecological measure PESOC will not be based on information from the study cohort, making the assessment of the primary exposure independent from that of the outcome. Parental informed consent will not be needed for the PESOC assessment, since student ratings will be anonymous and will not encompass personal information. Students will be asked to complete the questionnaire in paper during an ordinary class session. Teachers will have access to both paper and electronic versions of the questionnaire.

At baseline, information relative to other structural and organizational characteristics of the school will be collected by the principal, in particular concerning the personnel, their qualifications and professional development, as well as turn-over during the past year; forms of students’ and families’ participation; written policies and rules (e.g. concerning substance use, mobbing); common educational programs targeting behavioral and psycho-social risk factors.

3.1.2 Measurement of primary and secondary outcomes

The primary outcome, mental ill-health will be primarily assessed by means of multi-informant (teacher, parent, child) completion of the 25-item Strengths and Difficulties Questionnaire (SDQ). The SDQ is widely used and constitutes a valid instrument for screening of child mental disorders in community samples [19, 20] that is short, fast to complete (less than 30 minutes) and generates dimensional measures of mental ill-health. Multi-informant SDQ data can be used to predict psychiatric disorders fairly well [19]. The items are divided into five scales with five items each: Hyperactivity-Inattention, Emotional Symptoms, Conduct Problems, Peer Problems and Prosocial Behavior. The SDQ will be administered at baseline, at the beginning of each school year during the remaining compulsory grades and in the fall of year 5, at the transition towards the upper education. In order to increase the validity of the outcome assessment in the domain of internalizing problems the Center for Epidemiologic Studies Depression Scale for Children (CES-DC) [21], a 20-item instrument extensively used in population surveys and validated in Italy will be also administered.

Procedure: The parents’ and children’s SDQ assessments will provide a first-step screening assessment. The parent’s SDQ questionnaire will be incorporated in a wider family assessment questionnaire (see 3.1.3) (Attachment 1C). The student instruments (SDQ and CES-DC) will be incorporated in a comprehensive questionnaire (Attachment 1D) including also other information (see 3.1.3). At each assessment, children scoring above the 90th percentile in some or all mental problem dimensions covered by SDQ or scoring above 30 in
CES-DC scale will be considered as “probable cases” of any mental disorder in the present study. Newly detected cases will be communicated to the family.

3.1.3 Other socio-demographic and psycho-social factors

In order to control for potential confounding factors, to study mediatory as well as interaction effects, further data will be collected at the level of the class, family and individual student, at baseline and during each year of follow-up.

School class-level factors will be elicited in a structured interview with responsible teachers or mentors, and will include questions partially similar to those asked for the whole school, such as: number of students; formal competence of the teachers in the core subjects; curricular activities for each core subject; cross-disciplinary and special pedagogic activities. Part of the interview will concern the social climate in the class, i.e. perception of discipline and absenteeism; and the quality of relations among students, between students and teachers, and among teachers.

Family level factors will be elicited through a structured parental questionnaire (Attachment 1C) and register-based information. The parental questionnaire includes questions on composition of the family and the index child’s cohabitation forms; parental employment and income; attitudes and expectations towards school achievements; bonding within family; guardians’ own use of alcohol and tobacco. Register based information will encompass parental history of diseases.

Student-level factors will be elicited through a structured questionnaire (Attachment 1D) and record linkages with administrative and health registers. Besides the SDQ and the CES-DC scales mentioned in paragraph 3.1.2, the student’s questionnaire will include items on their bonding with parents and peers, lifetime and recent use of tobacco, alcohol and illicit drugs, and school orientation. Register-based information will include, in addition to outcome data described in paragraph 3.1.2: hospital admissions, prescribed drug, birth weight, fetal growth, gestational age and Apgar score (via the Local Health Authority database), days of unjustified school absenteeism (truancy), and academic grades from school registers.

3.2 Statistical methods

3.2.1 Statistical power

The sample size was calculated to estimate the prevalence of depressive symptoms with a definite precision (95% CI) and to perform a statistical test for the comparison of the mean scores of the depression scale (CES-D) according to students’ school achievement. The mean score of CES-D observed in the Swedish adolescents enrolled in the Swedish arm of the study was 13.5 (SD=10), and the prevalence of depressive symptoms was 10%. The recruitment of 1000 students will allow to estimate a prevalence of depressive symptom of 10% ± 2%. The mean scores of CES-D scale were 17.5 and 12.5 in the students with the lowest school achievement (20%) and in those with higher achievement (80%), respectively. Therefore, the enrolment of 1000 students, given the previous parameter estimates, and assuming a SD=10 in both groups, will allow us to find a statistical significance two-tailed test with alpha at 5%, using the t-student test for two independent samples, with more than 90% power.

3.2.2 Statistical analysis

Because the accrued data will have an inherent hierarchical structure, with students grouped in classes and schools, multilevel regression modeling will be used [22]. The primary outcome (SDQ-based mental health problems) and most secondary outcome variables (e.g.
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substance abuse, conduct disorders, internalizing symptoms) will be analyzed as continuous and dichotomous variables, using appropriate cut-offs according to literature. Therefore, various multiple regression models will be used, including linear, logistic and Poisson regression. The primary exposure (PESOC) will be analyzed as a continuous as well as a categorical variable. In the main analysis we will explore the mediatory and effect-modifying role of school proficiency, other individual-level factors (above all, gender) and out-of-school factors (e.g. family circumstances) in the association between overall school pedagogic climate, its sub-dimensions and occurrence of mental disorders. We will also consider familial social circumstances such as migration status and social adversity, which may indeed have an impact on school context as well as mental health, as potential confounders [23]. Given the complex interplay of causal and non-causal relations occurring between different levels of environmental and individual factors, the primary analyses will be complemented with alternative estimation and testing techniques, such as structural equation modeling [24].

4. Timeline and plan for scientific deliverables
The study is expected to start in June 2017, after the formal approval by the local Ethics Committee. The preparatory work will be done during the first six months of the study. During this period we will sort out a pilot study in a sample of 100 students to evaluate the methodology that we will use. Field activities for the recruitment and follow-up of the study cohort and corresponding data collection will be conducted during years 1 to 4. In particular teacher and student perception of the culture, climate and ethos of schools (PESOC questionnaires, Attachment 1A and Attachment 1B) will be administered at baseline, while parent and student questionnaires (Attachment 1C and Attachment 1D) will be administered at baseline and each follow-up point. At the end of the study register-based information will be collected.

5. Societal value of the research
Mental ill-health is a key contributor to the global burden of disease among youths. [25] This project aims to provide decision makers with empirical evidence linking the triad of school environment- academic achievements- mental health, a central question in the often inflamed political debate on what constitutes an optimal school environment to both foster teenagers’ knowledge and well-being. In Italy, where important changes in compulsory education are advocated and expected in the coming years, there is a clear need for a large longitudinal study tackling school pedagogic environment in relation to teenagers’ mental health. As a spin-off, the study will offer important insights on feasibility, costs and effectiveness of a school-based screening for adolescent mental health problems.

6. Plan for communication with stakeholders and end-users
School management, teachers, students and their families will be clear end-users and beneficiaries of the advancement in knowledge expected from the research program. This should be true both on in a narrow (study participants) and in a broader sense, nation-wide. Therefore, the ambitious aim of the program is to provide with usable information decision-makers in the health-, the educational and ultimately the political arena. To this end, we will use both horizontal and vertical diffusion strategies.

7. Ethical considerations
The project will be submitted to the Ethics Committee of the Brescia province for approval. The research does not entail invasive or painful procedures. Active informed consent will be sought from the students’ parents. All the data concerning the subjects included in this study
will be obtained, treated and processed in accordance with current legislation on privacy protection - Legislative Decree n. 196 of 30/06/2003 and subsequent modifications. The data and the results of the research are owned by the Unit of Hygiene, Epidemiology and Public Health, University of Brescia. Their diffusion will be performed only as aggregate data, in the context of scientific congresses and publications.

8. Preservation and conservation of the documents
All information regarding participants, all clinical and laboratory data, as well as the documents related to submission and approval of the project by the Ethics Committee, informed consents and all regulatory documentation will be kept at the Unit of Hygiene, Epidemiology and Public Health of University of Brescia.

9. Principal investigator and collaboration
Dr. ssa Elena Raffett is the principal investigator. The study will be conducted in collaboration by the Unit of Hygiene, Epidemiology and Public Health, University of Brescia and Epidemiology and Public Health Intervention Research group (EPHIR) Department of Public Health Sciences Karolinska Institutet (Sweden).

10. References
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