

Mental health problems of Dutch adolescents: the association with adolescents' and their parents' educational level

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Background: We studied the hypothesis of socioeconomic equalization regarding adolescents' mental health problems by examining whether a low educational level of adolescents and their parents shows independent (cumulative) or dependent (including interactive) associations with adolescents' mental health problems, or whether equalization occurred. **Methods:** Cross-sectional data were obtained from the preventive Youth Health Care Centre in a relatively deprived Dutch former mining area. Participants were 1861 adolescents aged 13 or 14 years (response rate 71.7%). The self-administered Dutch version of the Strengths and Difficulties Questionnaire (SDQ) was used to identify adolescents' mental health problems. Multiple logistic regression analyses were used to examine the associations, and linear regression models to check the robustness of the findings. **Results:** A low educational level of adolescents was strongly related to their mental health problems (OR = 5.37; 95% CI: 3.31–8.70). The initially high odds ratios for adolescents with low-educated parents (OR = 1.72; 95% CI: 1.14–2.59) disappeared after controlling for the adolescents' own educational level (OR = 1.12; 95% CI: 0.73–1.74). In terms of interactions, no specifically increased odds were found, e.g. for low-educated adolescents with high-educated parents. **Conclusion:** There was no evidence for socioeconomic equalization regarding adolescents' mental health problems. Lower educated adolescents had substantially higher odds of having mental health problems, regardless of their parents' education. The odds may be affected by differences in intelligence and life events. Youth healthcare workers should collaborate closely with schools to intervene in time, particularly among low-educated adolescents. More interventions are probably needed to reduce these major inequities.

Keywords: adolescents, educational level, equalization, mental health problems, socioeconomic status.

Introduction

A substantial proportion of adolescents suffer from a range of mental health problems,¹ with prevalence rates ranging from 19% to 28%.^{2–5} Addressing these problems is important, because mental health problems in youth often continue into adulthood,^{6,7} and can have negative consequences for daily life, including problems with interpersonal relations and finding a job, and a higher risk of criminal behaviour.⁸ Of course, these consequences also lead to increased use of healthcare services and higher associated costs.

Possibly due to an increased exposure to adverse circumstances (e.g. poor housing and neighbourhood conditions) and due to the adverse cognitive and emotional consequences of being at the bottom of the socioeconomic hierarchy, several studies have reported an association between adverse socioeconomic circumstances and poor mental health in adolescence.^{9–13} Others have reported only limited or no influence (i.e. equalization) of low socioeconomic status on specific mental health outcomes.^{14–16} West and co-authors¹⁶ concluded that the presence or absence of equalization in adolescence probably depends upon both the specific health outcome and the specific socioeconomic measure studied. Further studies are thus needed to confirm or falsify the

equalization hypothesis regarding adolescents' mental health. With sole reference to adolescents' mental health outcomes, we examined whether—compared to a single socioeconomic measure—a more comprehensive account of socioeconomic status matters in estimating the extent of socioeconomic inequalities in adolescents' mental health outcomes.

More specifically, we examined whether a low educational level not only of the adolescents themselves but also of their parents has independent (cumulative) associations with mental health in adolescence. An absence of such independent associations would provide evidence for one of three alternative hypotheses. First, if only parents' educational level is associated with adolescents' problems, this might indicate that the parents' educational level offers a better reflection of the socioeconomic circumstances of the adolescents' life (and childhood), or that there is some kind of 'sensitive period' in earlier life determining later problems. In this hypothesis, current conditions influenced by the adolescents' own educational level are not important (figure 1: arrow c is not significant). Second, if only the adolescents' own educational level is associated with their mental health, this would imply that current conditions are more important than the conditions in earlier life. In this hypothesis, it is still possible that the parents' educational level is of influence, but it is purely through its association with the adolescents' educational level (intergenerational stability) that it affects the development of mental health problems (figure 1: arrow a is not significant). Third, if both educational levels interact, this indicates more complex associations (not shown in figure 1). For example, it is possible that low-educated adolescents with highly educated parents [who may have (unjustified) high aspirations for their children] are at a particularly high risk of mental health problems. Others have reported adverse health effects of intergenerational downward mobility and

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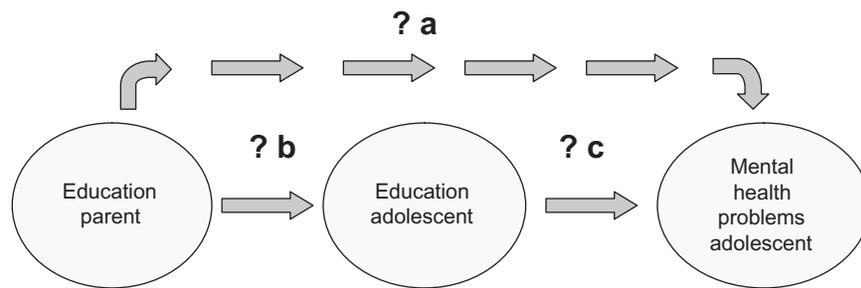


Figure 1 Model of the association of the adolescents' and their parents' educational level with the adolescents' mental health. Question marks indicate the to be quantified associations.

status inconsistency.^{17,18} Finally, it is of course also possible that both educational levels have independent (cumulative) associations with the adolescents' mental health (figure 1: both arrows a and c are significant) or that both levels show equalization in the adolescents' mental health outcomes (figure 1: neither arrow a nor arrow c is significant).

Our study was based on the data from a Youth Health Care Centre in the southeast of the Netherlands. In this relatively deprived former mining area, we tried to systematically examine whether a low educational level of the parents and the adolescents had independent, cumulative associations with the adolescents' mental health. A better understanding of the socioeconomic roots of adolescents' mental health problems and their timing in the life-course would perhaps allow (youth) healthcare workers to design better interventions to improve mental health in adolescence and to reduce socioeconomic inequalities in terms of mental health.

Methods

Study population

Cross-sectional data were obtained from the preventive Youth Health Care Centre in the southeastern region of the province of Limburg in the Netherlands. Between August 2006 and July 2007, all adolescents attending the second year of secondary school were invited for a standard health assessment and were asked to fill in a questionnaire in advance ($N=2595$). The response rate was 71.7% and it differed significantly with gender (70.1% boys and 74.6% girls), age (75.0% 13 years and 70.4% 14 years) and educational level of the adolescents (79.7% high level, 71.5% medium level and 59.5% low level).

The 1861 participants were either 13 ($N=823$; 44.2%) or 14 years old ($N=1038$; 55.8%); 893 were boys (48.0%) and 968 were girls (52.0%). Information on the adolescents' educational level was missing for 18 adolescents, while information on the parents' educational level was missing for 171 adolescents, leaving 1672 adolescents for the analyses.

Measures

Mental health

Mental health was assessed by means of the self-administered Dutch version of the Strengths and Difficulties Questionnaire (SDQ) for adolescents.¹⁹ This includes 25 symptom items and measures both negative (difficulties) and positive (strengths) behavioural and emotional attributes of the adolescent. There are five sub-scales (with five items each): emotional symptoms (e.g. being unhappy), conduct problems (e.g. fighting a lot), hyperactivity-inattention (e.g. being restless), peer relationship problems (e.g. playing alone) and prosocial behaviour (e.g. sharing with others). In previous

studies (including a study among young Dutch adolescents), factor analyses by and large confirmed the hypothesized dimensionality, test-retest stabilities appeared satisfactory (except for the prosocial behaviour subscale) and Cronbach's α was acceptable for the total difficulties scale (Cronbach's α range 0.70–0.78) and three subscales (Cronbach's $\alpha \geq 0.60$), but not for the conduct (Cronbach's α range 0.45–0.47) and peer problem (Cronbach's α range 0.39–0.54) subscales.^{20,21} Every item has three categories: 'not true' (0), 'somewhat true' (1) or 'certainly true' (2). The scores were summed for each scale. A total difficulties score was calculated by summing the scores of all the items, except those of the prosocial behaviour scale. All scales were dichotomized, with 1 referring to the adolescents with the 10% most negative scores and 0 referring to the other adolescents.

Educational level

The educational level of the parents was assessed by a brief questionnaire with one main question: 'What is the highest educational level (i.e. form of education for which you have obtained a diploma) attained by you and your partner?' The educational level of the parents was defined as the highest educational level attained by the father or mother. If information on the education of one of the parents was missing, information for the other parent was used. Three categories were distinguished: high (university or higher vocational education), medium (higher general secondary education or intermediate vocational education) and low [primary education, lower vocational education, intermediate general secondary education or no education (not completed primary school)]. Information about the educational level of the adolescents was obtained from the administrative departments of their schools. Their educational level was also recoded into three categories: high (higher general secondary education), medium (lower vocational education or intermediate general secondary education) and low (primary or special education).

Statistical analysis

Multiple logistic regression models were used to examine the association between the parents' and the adolescents' educational level and the adolescents' mental health, using the highest level of education of the parents and adolescents as the reference category. The first model was adjusted for age and gender, while the second model included simultaneous adjustment for the educational levels of parents and adolescents. The age- and sex-adjusted odds ratios for the adolescents' educational level were estimated within the individual categories of parental education. Product terms (of parents' and adolescents' educational level) were used to formally test the interaction between the education levels of the parents and the adolescents (controlling for the main

terms). Subgroup analyses were also performed with separate logistic regressions for adolescents' educational level within categories of their parents' educational level. Linear regression models with the continuous scores of the various SDQ scales were used to check the robustness and consistency of the findings. A check on linearity was also performed by testing the quadratic terms of the parents' and adolescents' educational level for their statistical significance. The quadratic terms did not reach the statistical significance. All statistical analyses were performed using SPSS 14.0.2.

Results

A Cronbach's α of 0.78 was found for the total difficulties scale and a range of 0.61–0.75 for three SDQ subscales. The peer and the conduct problem subscales had a Cronbach's α of 0.49 and 0.50, respectively (not tabulated).

Given the theoretical range of the SDQ scales (with a maximum of 40 for the total scale and a maximum of 10 for the subscales), the adolescents had relatively favourable scores, with low means for the difficulties and a high mean for the prosocial subscale (table 1). Hyperactivity was the most commonly reported difficulty, with the highest mean and median (3.70 and 4.00, respectively).

Table 2 shows that the lower the education of the parent and adolescent, the higher the percentage and odds ratio of mental health problems. For the total SDQ scale in Model 1, the odds ratio was 5.37 (95% CI: 3.31–8.70) for lower educated adolescents compared with their higher educated counterparts, and an odds ratio of 1.72 (95% CI: 1.14–2.59) for adolescents with low-educated parents. There was no association with prosocial behaviour. The results also show that the adolescents' educational level was much more strongly related to the adolescents' mental health than their parents' educational

Table 1 Frequencies and mean SDQ scores

	<i>N</i>	<i>N</i> missing	Mean (SD)	Median	Observed min	Observed max
SDQ Total difficulties score ^a	1741	120	8.28 (4.89)	8.00	0	29
SDQ Emotional symptoms score ^b	1838	23	2.09 (1.97)	2.00	0	10
SDQ Conduct problems score ^c	1839	22	1.45 (1.34)	1.00	0	9
SDQ Peer problems score ^d	1783	78	1.07 (1.31)	1.00	0	7
SDQ Hyperactivity score ^e	1844	17	3.70 (2.45)	4.00	0	10
SDQ Prosocial score ^f	1845	16	8.00 (1.65)	8.00	1	10

a: Theoretical min 0–max 40

b: Theoretical min 0–max 10

c: Theoretical min 0–max 10

d: Theoretical min 0–max 10

e: Theoretical min 0–max 10

f: Theoretical min 0–max 10

Table 2 Odds ratios (95% confidence interval) of mental health problems by parents' and adolescents' educational levels, controlling for age and sex, without (Model 1) and with (Model 2) simultaneously controlling for the educational level of parents and adolescents^a

	<i>N</i>	Percentage with mental health problems	Model 1 OR (95% CI)	Model 2 OR (95% CI)
<i>SDQ-Total</i>				
Education of parent				
High ^b	483	8.70	1.00	1.00
Medium	618	10.80	1.29 (0.85–1.93)	0.96 (0.63–1.47)
Low	477	14.00	1.72 (1.14–2.59)	1.12 (0.73–1.74)
Education of adolescent				
High ^b	852	6.20	1.00	1.00
Medium	592	15.00	2.79 (1.94–4.01)	2.77 (1.90–4.03)
Low	134	25.40	5.37 (3.31–8.70)	5.16 (3.13–8.51)
<i>SDQ-Emotional problems</i>				
Education of parent				
High ^b	497	10.70	1.00	1.00
Medium	645	11.90	1.04 (0.71–1.52)	0.90 (0.61–1.33)
Low	510	15.10	1.37 (0.94–2.01)	1.12 (0.75–1.67)
Education of adolescent				
High ^b	870	9.90	1.00	1.00
Medium	632	15.20	1.74 (1.26–2.40)	1.73 (1.24–2.42)
Low	150	16.70	2.01 (1.22–3.29)	1.91 (1.14–3.19)
<i>SDQ-Conduct problems</i>				
Education of parent				
High ^b	499	13.40	1.00	1.00
Medium	645	18.30	1.47 (1.06–2.04)	1.17 (0.83–1.64)
Low	515	19.80	1.63 (1.16–2.29)	1.16 (0.81–1.66)
Education of adolescent				
High ^b	873	11.00	1.00	1.00
Medium	634	22.90	2.37 (1.78–3.16)	2.29 (1.71–3.08)
Low	152	30.30	3.46 (2.30–5.21)	3.32 (2.17–5.06)

(continued)

Table 2 Continued

	<i>N</i>	Percentage with mental health problems	Model 1 OR (95% CI)	Model 2 OR (95% CI)
<i>SDQ-Peer relation problems</i>				
Education of parent				
High ^b	491	11.80	1.00	1.00
Medium	631	13.30	1.16 (0.81–1.67)	0.99 (0.69–1.44)
Low	490	15.90	1.44 (1.00–2.07)	1.15 (0.78–1.69)
Education of adolescent				
High ^b	863	10.20	1.00	1.00
Medium	610	16.70	1.77 (1.30–2.42)	1.75 (1.27–2.41)
Low	139	21.60	2.41 (1.52–3.83)	2.30 (1.43–3.72)
<i>SDQ-Hyperactivity problems</i>				
Education of parent				
High ^b	496	11.50	1.00	1.00
Medium	645	16.00	1.46 (1.03–2.08)	1.22 (0.85–1.75)
Low	517	16.20	1.50 (1.05–2.16)	1.14 (0.78–1.67)
Education of adolescent				
High ^b	877	10.30	1.00	1.00
Medium	629	18.80	2.00 (1.48–2.70)	1.92 (1.41–2.62)
Low	152	23.70	2.68 (1.74–4.14)	2.60 (1.65–4.07)
<i>SDQ-Prosocial problems</i>				
Education of parent				
High ^b	500	8.20	1.00	1.00
Medium	646	7.60	1.04 (0.67–1.61)	0.93 (0.59–1.47)
Low	513	6.60	0.88 (0.55–1.43)	0.82 (0.49–1.34)
Education of adolescent				
High ^b	876	6.40	1.00	1.00
Medium	632	9.50	1.56 (1.05–2.30)	1.61 (1.08–2.42)
Low	151	5.30	0.79 (0.37–1.71)	0.85 (0.39–1.86)

a: Results in bold indicate a significant difference ($P < 0.05$) in odds of mental health problems

b: The highest levels of education attained by the adolescents and parents are used as the reference category, meaning odds ratio = 1.00

level. When both were controlled for each other in Model 2, the association between the parents' educational level and the mental health of their offspring became weaker and even non-significant. This indicates that there was no remaining independent influence of the parents' education level.

Table 3 shows that the interaction between the two educational indicators was not significant at the 0.05 level. This did not hold for the conduct problem subscale (P -value: 0.047). However, the direction of the interaction (in terms of odds ratios) showed contradictory patterns across outcomes, i.e. the strongest associations were sometimes found for highly educated parents (emotional problems) and sometimes for low-educated parents (conduct problems). Furthermore, using continuous scores with linear regression did not confirm a significant interaction for conduct problems (not tabulated).

The pattern of findings remained similar when we examined the effects in boys and girls separately and when we used linear regression analyses with the continuous scores of the various SDQ scales (except for none of the interactions being statistically significant) (not tabulated).

Discussion

The present study among adolescents from one of the most deprived areas (a former mining district) of the Netherlands found a strong association between a low educational level of the adolescents and higher odds of mental health problems. There was an initial association with their parents' educational level, but this disappeared when we controlled for the adolescents' own educational level. The educational levels of the adolescents and their parents did not interact in their association with mental health. Hence, the equalization hypothesis was falsified as regards adolescents' mental

health in our sample, as our second hypothesis, postulating associations with the adolescents' own educational level, was confirmed. In none of the analyses did we find effects on the prosocial scale.

The fact that only the adolescents' own educational level was associated with their mental health implies that current socioeconomic and sociocultural conditions were more important than the conditions in earlier life. The parents' educational level was still of influence, but it was entirely through its association with the adolescents' own educational level (related to the level of intergenerational stability) that it affected the development of mental health problems among their offspring. There was no difference in terms of mental health problems between adolescents with a low educational level whose parents had a high educational level and those whose parents had a low educational level, but they did differ from their higher educated adolescent counterparts in having poorer mental health scores. Our findings thus not only contribute to a further understanding of the equalization theory regarding adolescents' health¹⁶ but they also offer further insights into the specificities of life course influences on socioeconomic differences in mental health.²²

The social ranking theory of depression might offer a useful explanation of the predominant role of current socioeconomic conditions.^{23,24,25} This theory postulates that some animals withdraw from fights and conflicts over scarce resources and higher positions in the ranking hierarchy, and that these inhibitory strategies result in responses that closely resemble depressive symptoms in humans.²⁶ Humans base their hierarchies not only on physical strength but also on differences in available resources and capacities, such as intelligence.²³ Hence, a low-educated adolescent in our sample might feel that he or she is unable to attain a higher level of education (due to lower intelligence); the inhibiting

Table 3 Odds ratios (95% confidence interval) of mental health problems by educational level of the adolescent, for high, medium and low parental education, adjusted for age and sex^a

Education of the adolescent	Education of parent High OR (95% CI)	Education of parent Medium OR (95% CI)	Education of parent Low OR (95% CI)	P-value of Interaction ^b
<i>SDQ-Total</i>				
High ^c	1.00	1.00	1.00	0.13
Medium	1.41 (0.65–3.04)	2.71 (1.48–4.93)	5.14 (2.39–11.03)	
Low	4.62 (1.52–14.01)	6.47 (2.74–15.26)	6.60 (2.77–15.74)	
<i>SDQ-Emotional problems</i>				
High	1.00	1.00	1.00	0.28
Medium	2.24 (1.17–4.29)	1.40 (0.83–2.35)	1.61 (0.90–2.86)	
Low	4.38 (1.42–13.51)	2.17 (0.85–5.51)	1.22 (0.57–2.61)	
<i>SDQ-Conduct problems</i>				
High	1.00	1.00	1.00	0.05*
Medium	1.52 (0.84–2.74)	1.85 (1.19–2.88)	4.87 (2.64–9.00)	
Low	2.89 (0.98–8.51)	3.79 (1.87–7.67)	4.84 (2.38–9.85)	
<i>SDQ-Peer relation problems</i>				
High	1.00	1.00	1.00	0.54
Medium	1.56 (0.84–3.01)	1.64 (0.99–2.71)	1.93 (1.09–3.41)	
Low	3.36 (1.13–9.97)	3.09 (1.40–6.83)	1.68 (0.80–3.53)	
<i>SDQ-Hyperactivity problems</i>				
High	1.00	1.00	1.00	0.24
Medium	1.45 (0.77–2.72)	1.66 (1.05–2.64)	3.26 (1.76–6.07)	
Low	1.79 (0.49–6.51)	3.34 (1.62–6.89)	3.19 (1.54–6.62)	
<i>SDQ-Prosocial problems</i>				
High	1.00	1.00	1.00	0.98
Medium	1.44 (0.69–2.97)	1.58 (0.85–2.97)	1.94 (0.86–4.39)	
Low	0.66 (0.08–5.18)	1.00 (0.28–3.57)	0.91 (0.27–3.04)	

a: Results in bold indicate a significant difference ($P < 0.05$) in odds of mental health problems for medium- or low-educated adolescents compared with high-educated adolescents

b: The P -value of the product term (interaction) between the adolescents' and parents' educational level is shown

c: The highest level of education of the adolescent is used as the reference category

* P -value $0.05 = 0.047$

mechanisms used to cope with this could lead to a higher risk of feeling inadequate, depressed, withdrawn and submissive, which could lead to various mental health problems. The pervasive meritocratic culture may further intensify these feelings of being at the bottom of the pecking order, as in this perspective those with low educational levels are thought—by others, but ultimately also by themselves—to have ended up there because of a presumed lack of effort and of intelligence. In those at the bottom, feelings of shame and inferiority are then a likely outcome.^{27,28}

Simultaneously, such processes point to possible selection effects underlying socioeconomic differences in mental health. Evidence is increasing that intelligence may be one of the deciding factors whether someone ends up in low-socioeconomic ranks (including low educational categories) as well as in the group with a poor (mental) health status.^{29–31} Intelligence is even the main criterion in the Netherlands for being referred to special education schools,³¹ which constituted the dominant group in our 'low' education category. Unfortunately, the cross-sectional design of our study and the absence of an intelligence measure imply that we cannot exclude such selection effects. The issue of causality and the specific role of intelligence should thus be examined in more detail in a longitudinal study.

Stressful life events, like the loss of a dear one, parental divorce and victimization through sexual and physical abuse, might also have contributed further to the higher odds of mental health problems among low-educated adolescents. Chronic stressors and stressful life events are known to increase mental health problems among adolescents,^{32–34} and the stressful adversities might be more common in the living circumstances of low-educated adolescents.³³ As our study did not include information on life events, we recommend further

research into their potential mediating role regarding socioeconomic inequalities in adolescents' mental health.

Methodological limitations

The SDQ measure that we used had weak psychometric properties in terms of internal consistency for the subscales of conduct and peer problems, as has also been found in previous studies.^{20,21} Some reversely scored items might have been confusing, as was the presence of items that ask for specific problems that are uncommon.²⁰ Adolescents might find it difficult to report these problems and perhaps not all adolescents are completely aware of them.²¹ It might be useful to also use the parent and teacher SDQ version to more validly examine the mental health problems among adolescents. Given its satisfactory reliability, it is unclear why the prosocial scale was the only subscale not related to the educational level. Perhaps the exceptional reverse categories (high scores indicating better mental health) have compromised its validity. Although we acknowledge the rather arbitrary cut-off score for defining mental health problems (using the worst decile), it is re-assuring that the use of continuous scores and the use of linear regression analyses resulted in similar patterns of findings. A further sensitivity analysis using a cut-off based on the worst 20% scores of mental health problems further confirmed the general pattern of our findings.

Although we accounted for any socioeconomic effects during upbringing by looking at both the parents' and the adolescents' educational level, the parental socioeconomic status in particular may not have been validly captured by our measure of educational level.¹⁶ Perhaps information on the occupational or income level of the parents would have added to the prediction of mental health problems

in their offspring. Similarly, the adolescents' socioeconomic status would have been better represented if we had added reports of subjective status.^{16,35} More research is thus needed, although additional measures such as income, might have their own drawbacks.

The lower educated adolescents participated much less than their higher level counterparts (60% versus 80%). Unfortunately, no information was available on the mental health of the non-participants. If we assume poorer mental health outcomes in the non-participants (as is done in most other studies) and assume similar associations of educational level with mental health problems in the non-participants, the associations reported here might have been underestimated. The 171 (9.3%) adolescents with missing information on their parents' educational level were more likely to have a lower educational level than the remaining group (21.1% versus 9.2%; *P*-value of the difference <0.01). This may also have led to an underestimation of the effect of the parents' educational level. Finally, the reported findings, based on the adolescents living in one of the most deprived areas (a former mining district) of the Netherlands, cannot be generalized to regions with better socioeconomic circumstances.

Conclusion

We found no evidence for equalization in adolescents' mental health problems. Those with a lower educational level had five times higher odds of mental health problems, independent of their parents' educational level. The findings indicate that youth healthcare workers should continue to collect, or start collecting, socioeconomic data on adolescents. They could intensify interventions, or set up new interventions, at secondary schools, where the teachers team up with school officials, (preventive) youth healthcare, social workers and mental health professionals. These school care or advisory teams^{36,37} should focus on preventing mental health problems among adolescents (or worsening of such problems). Another possible intervention to reduce mental health inequalities is local municipal authorities offering low-educated adolescents from low-income families opportunities to participate in sports clubs.³⁸ In the Netherlands, a recent governmental report specifically addressed socioeconomic health inequalities, but this has been criticized for not proposing enough decisive action, particularly as regards issues of youth health. We further endorse the final report of the WHO Commission on Social Determinants of Health,³⁹ which recommended that governments should 'provide quality education that pays attention to children's physical, social/emotional and language/cognitive development, starting in pre-primary school'. The evidence base for interventions addressing socioeconomic inequalities (among youth) is increasing, but we still need further cross-validation and extensive and innovative efforts exploring new interventions.⁴⁰

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Conflicts of interest: None declared.

Key points

- There was no evidence for socioeconomic equalization regarding adolescents' mental health problems, as there was a strong association between a low educational level of the adolescent and his or her mental health problems.
- The educational level of the adolescents' parents influenced adolescents' mental health, but only through its association with the adolescents' own educational level.
- To reduce socioeconomic mental health inequalities among adolescents, youth healthcare workers should continue to collect, or start collecting, socioeconomic data on adolescents and participate in the development and evaluation of evidence-based interventions.

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