Original Research

The relationship between overweight and education revisited: a test of the selection hypothesis based on adolescents' educational aspirations

L. Diaz-Serrano [a, b, *], A.P. Stoyanova [c]

[a] ECO-SOS, Universitat Rovira i Virgili, Department d'Economia, Av. de la Universitat 1, 43204, Reus, Spain
[b] ECEMIN, Universidad Antonio Nebrija, C/ Sta. Cruz de Marcenado, 27, 28015, Madrid, Spain
[c] Faculty of Economics and Business Administration, Department of Economic Theory, University of Barcelona, 08034, Barcelona, Spain

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ABSTRACT

Objectives: This paper examines the selection mechanism underlying the association between overweight/obesity and educational aspirations of adolescents.
Study design: This is a cross-sectional study based on a survey conducted in secondary schools in Spain in 2016.
Methods: We estimate linear probability models to determine the association between adolescents' body mass index (BMI) and their expectations to obtain a university degree, as well as their school choices representing the most usual path towards higher studies. To address the potential endogeneity of BMI, we use the instrumental variables (IV) method. Additionally, we account for potential unobserved heterogeneity by including school fixed-effects and a wide set of individual and family characteristics in our analysis.
Results: Our results indicate that adolescents with a higher BMI have lower expectations to obtain a university degree and are less likely to enrol in high school with the intention to pursue higher education in the future. The estimated effect is quite sizable and statistically significant only for girls. We estimate that a five-unit increase in BMI (e.g., the change between healthy weight and overweight) reduces girls' expectations to complete higher education by 19 percentage points and odds of enrolling in high school (vs. vocational training) by 21 percentage points.
Conclusions: We provide empirical evidence supporting the selection hypothesis behind the relationship between BMI and adolescents' educational aspirations. That is, unhealthy weight in adolescence is associated with poorer aspirations for further education. Lower educational aspirations during adolescence can lead to lower academic achievement, which in turn, may result in poorer health, labour market outcomes, and well-being during adulthood.
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Introduction

Assessing the relationship between weight status (overweight/obesity) and education in youth is of considerable relevance since both can be targeted, and improved, through policy interventions that are much less costly than health care during adulthood. A growing number of studies documents the inverse association between individual's weight status and education.[1,2,3] However, the debate about the true nature of this association remains unsettled.

That may be because most of previous research ignores the potential endogeneity of unhealthy weight with respect to education or does not consider confounding factors affecting both of them.

There are two causal mechanisms underlying the negative correlation between overweight/obesity and education, each bearing very different policy implications. The dominant view is that education protects against unhealthy weight.[4,5,6] That is, more educated individuals have a better understanding of the adverse effects of overweight/obesity and tend to engage more in healthy behaviours.[7,8,9,10]

The hypothesis that the inverse relationship between education and overweight/obesity might also be due to selection (*reverse causality*) has gained attention over the past decade. It states that students with unhealthy weight may be less efficient in acquiring

* Corresponding author. ECO-SOS, Universitat Rovira i Virgili, Department d'Economia, Av. de la Universitat 1, 43204, Reus, Spain. Tel.: +34 977 75 89 10.
E-mail address: luis.diaz@urv.cat (L. Diaz-Serrano).

additional human capital[11] and thus, attain lower levels of education.[12,13,14] Our study should be framed in this literature.

Overweight/obesity may also contribute to poor cognitive achievement and academic performance,[15,16,17] more missed school days, frequent grade repetition and dropouts,[18,19] worse teacher assessments,[20,21] and lower likelihood of degree attainment.[22] Overweight students tend to underestimate their academic competence[18] and are less satisfied with their educational performance.[23]

Higher body weight may also impact the aspirations of completing secondary or higher education. Aspirations and expectations have been shown to influence both enrolment and persistence in pursuing a university degree and future labour market success.[16,24] Yet, these have been understudied in the literature on overweight/obesity and education. We know only three studies that analyse if weight status determines educational expectations and aspirations and are, therefore, relevant to our research.[18,23,25] Plus, the results from these works have been conflicting. Only one of these studies found that, for US adolescent girls, obesity was associated with lower expectations of college degree completion.[18] Being overweight/obese appeared not to affect the expectations for higher education in US youth[25] or the aspirations for additional educational qualifications in Australian young working women.[23] However, all three studies fail to account for the potential endogeneity of weight status on educational expectations and aspirations.

Our analysis aims to deepen the understanding of the association between overweight/obesity and educational aspirations of Spanish youths. We focus on the selection mechanism. More specifically, we test whether overweight students in the final year of compulsory secondary education (aged 16) have lower expectations to achieve university education and are less likely to choose the post-compulsory school track that gives access to higher education. A negative association between unhealthy weight and educational aspirations would confirm the selection hypothesis.

Policy interventions at younger ages can be very effective since high school students' aspirations for further education are still very malleable. Thus, policymakers may be able to nudge adolescents towards better educational choices, which are closely related to long-term educational outcomes, such as attending and graduating from university, future career choices, and social status attainment.

Methods

Data

The data come from a survey conducted in April/May 2016 in secondary schools in Catalonia, a north-east region of Spain. It was specially designed for a research project studying the determinants of school performance, as well as academic and labour market expectations of students in compulsory secondary education. The database contains socio-demographic characteristics, personality traits, cognitive and non-cognitive skills, family background, school outcomes, students' academic intentions for the next year, and academic and labour market expectations in the medium and long run.

The invitation to participate in the survey was sent out to all 564 public secondary schools in Catalonia (52.1% of all secondary schools), from which, 92 agreed to participate. This represents a reasonably good sample, comprising 16% of all public schools in Catalonia and accounting for 9550 students. Although the sample of participant schools is not random, it is very representative of the population of adolescents and their families in Catalonia. In particular, our data closely match the data regarding adolescents' high school attendance, school choices, educational expectations, and the distribution of BMI from administrative sources from the Government of Catalonia and other official surveys. More detailed information about the survey design and the assessment of the

sample representativeness can be found in the Methodological Appendix.

In our final sample, almost half of the surveyed students (45.5%) were in their last year of compulsory secondary education (aged 16); the rest were enrolled in post-compulsory secondary education (aged 17–18). Here, we focus on students in their last year of compulsory education since it is when they decide whether to enrol in high school and pursue higher education later; proceed to vocational training, which does not give direct access to higher education; or leave studies.

Outcome variables

We use two variables to assess the relationship between BMI and educational aspirations and choices. The first one is based on the responses to the question: *"Which is the highest level of education you expect to achieve?"* We create a dummy variable that equals one for students who expect to obtain a university degree. More than half of the adolescent boys and almost two-thirds of the girls in our sample expect to graduate from university (see Table 1).

Our second outcome variable picks up the intentions to pursue higher education. Students in their last year of compulsory secondary education report their plans for the following year. They can choose between attending high school (61.3% in our sample), vocational training (31.0%), or no further education (1.0%). Since attending high school is the most usual path towards university studies, we define a dummy variable that equals one for students who intend to enrol in high school during the following year with the intention to go to university. In our sample, 86% of the students who answered that they expected to obtain a university degree reported their intention to enrol in high school the following year. Not all students who attend high school ultimately go to university. Almost one in four high school graduates decide not to proceed to higher education; the share is greater among boys (28.9%) than among girls (19.3%). Only 6.7% of the surveyed students declared that they did not know what they were going to do the year after completing compulsory secondary education.

Explanatory variables

Our key variable is adolescents' self-reported BMI, calculated as weight in kilograms divided by height in metres squared. The mean BMI in our sample is 21.2 (21.3 for boys and 21.0 for girls).

To isolate the effect of BMI on educational aspirations, we control for a wide set of covariates that are hypothesised to influence the decision to pursue university education. Besides the usual socio-demographic characteristics, we include some cognitive and

Table 1
Expectations to obtain a university degree and school choices.

	All		Boys		Girls	
	N	%	N	%	N	%
Expect to obtain a university degree						
Yes	1641	59.8	700	52.6	941	66.5
No	1104	40.2	630	47.4	474	33.5
School choice next year for all students						
High school	1871	61.3	822	55.8	1049	66.5
Lower vocational	946	31.0	511	34.7	435	27.6
Leave studies	30	1.0	16	1.1	14	0.9
Do not know	203	6.7	123	8.4	80	5.1
School choice next year for students who expect to obtain a university degree						
High school	1548	86.0	646	84.3	902	87.2
Lower vocational	204	11.3	98	12.8	106	10.2
Leave studies	9	0.5	3	0.4	6	0.6
Do not know	40	2.2	19	2.5	21	2.0

non-cognitive abilities, personality traits, and parental involvement in their children's education. Cognitive abilities are proxied by the folllowing: a dummy variable indicating whether the adolescent had been diagnosed with a learning difficulty, a dummy variable indicating whether the student follows some adapted courses, and an ordinal scale (1—4) indicating whether the student has difficulties understanding teachers' explanations. The daily number of hours dedicated to doing homework is our proxy for non-cognitive skills. Self-efficacy is measured by self-assessed skills in mathematics and self-assessed ability to do things that one dislikes (both ranging from 1 to 10). Risk aversion is a dummy variable obtained from the responses to a question where individuals had to choose between being paid a fixed salary or a wage based on a piece-rate system in a hypothetical job.

We also control for the adolescent's birthplace (Spain or abroad), parents' education (two dummy variables indicating whether the father/mother holds a university degree), parents' marital status and employment situation (a dummy variable indicating whether father/mother is unemployed), the number of siblings, and the number of siblings who have dropped out of secondary school. The parents' involvement in their children's education is proxied by a variable reflecting the frequency by which parents help their children do the homework (ranging from 1 never to 4 always for each parent). Our indicator is the sum for both parents; therefore, it ranges from 2 to 8. Finally, we include a variable indicating whether the adolescents consider their parents put too much pressure on their school choices (varying from 1 strongly disagree to 4 strongly agree). Table 2 presents a summary of the sample's characteristics by gender and expectations to obtain a university degree.

Empirical model

We start by estimating linear probability models of students' expectations to obtain a university degree and of the decision to enrol in high school after completing compulsory secondary education. The dependent variables are regressed on BMI and the set of relevant covariates previously described.

Secondly, we estimate a three-layer multilevel model, which includes levels for students, schools, and municipalities of residence. At the school level, we incorporate two variables: the proportion of students with at least one parent with higher education, which may partially account for the students' social background within a specific school, and the average student's satisfaction with school resources, which reflects the school's quality. At the municipal level, we include the logarithm of the average household income and the unemployment rate. These variables proxy the economic conditions and the employment prospects of the municipality.

In the school context, unobserved individual factors can affect both BMI and school outcomes. Failure to account for this unobserved individual heterogeneity in the model may cause endogeneity. Consequently, the fixed-effects Ordinary Least Squares or the multilevel estimates of the regression coefficient of BMI will be biased. Our data allow us to account for some of these factors, thus, reducing the individual unobserved heterogeneity. However, since it may not always be possible to consider all these factors, the possibility of having an endogeneity problem in our estimates cannot be entirely ruled out. Therefore, we use the instrumental variables (IV) method. Instead of using the BMI indicator as a covariate in the linear probability models, we include an instrumental variable that is highly correlated with BMI but is independent of the

Table 2
Descriptive characteristics by gender and expectations to obtain a university degree.

	Boys				Girls			
	Do not expect to obtain a university degree		Expect to obtain a university degree		Do not expect to obtain a university degree		Expect to obtain a university degree	
	Mean	*Std. dev.*	*Mean*	*Std. dev.*	*Mean*	*Std. dev.*	*Mean*	*Std. dev.*
BMI	21.494	3.453	21.080	3.209	21.393	3.307	20.777	2.960
Born abroad	0.195	0.396	0.120	0.325	0.245	0.430	0.153	0.360
Diagnosed with a learning difficulty	0.142	0.349	0.071	0.258	0.122	0.328	0.052	0.222
Following some adapted courses	0.238	0.426	0.161	0.367	0.315	0.465	0.191	0.393
Difficulties understanding teachers (1—4)	2.001	0.684	1.753	0.655	2.055	0.659	1.798	0.622
Daily hours of doing homework	1.375	1.462	1.505	1.096	1.846	1.327	2.244	1.200
Self-assessed skills in mathematics	6.372	2.193	7.641	1.904	5.369	2.178	6.566	2.139
Self-assessed skills in doing things one dislikes	6.528	2.262	7.180	2.045	6.691	2.101	7.440	1.875
Prefers a variable wage over a fixed wage	0.628	0.484	0.714	0.452	0.649	0.478	0.642	0.480
Father has a university degree	0.083	0.276	0.213	0.410	0.069	0.254	0.179	0.384
Mother has a university degree	0.104	0.306	0.304	0.460	0.098	0.297	0.273	0.445
Father is unemployed	0.081	0.273	0.047	0.212	0.079	0.270	0.055	0.229
Mother is unemployed	0.107	0.309	0.072	0.258	0.102	0.303	0.071	0.256
Parents' marital status								
Married	0.662	0.473	0.730	0.444	0.626	0.484	0.707	0.455
Separated/divorced	0.237	0.425	0.199	0.400	0.262	0.440	0.215	0.411
Other	0.101	0.302	0.071	0.256	0.112	0.316	0.079	0.269
Number of siblings	1.511	1.183	1.294	1.009	1.762	1.348	1.363	1.059
Number of siblings who are dropouts	0.729	1.172	0.460	1.004	0.794	1.154	0.437	0.957
Parents help do the homework (2—8)	3.825	1.538	3.675	1.426	3.891	1.536	3.945	1.667
Parents' pressure on school choices (1—4)	2.070	1.050	1.800	0.970	1.950	1.070	1.660	0.940
N		726		794		532		1066

Abbreviation: BMI = body mass index.

unobserved factors influencing educational outcomes and of student's previous academic performance. Namely, to instrument individual BMI, we use the average BMI across same-sex residents of the municipality where the student lives. The empirical strategy and the tests performed to validate the instruments are explained in detail in the Methodological Appendix.

Results

The impact of BMI on higher education expectations and school choices

Our main interest is the causal impact of BMI on educational aspirations. Table 3 provides the results of the multilevel, fixed-effects OLS, and IV models that regress our two outcome variables on BMI. It also reports some specification tests. The tests of the validity of the instruments reveal that the instrument is exogenous and strong. The inclusion in the second stage equation (see Methodological Appendix) of the two municipality-level covariates allows us to enhance the confidence of the exogeneity of our instrument and strengthen the validity of the results. The exogeneity tests reveal that BMI is endogenous for girls but not for boys. The IV method provides quite sizable effects of BMI on the expectations to graduate from university and intentions to attend high school as a path to higher studies for girls, whereas for boys, the estimated effects are statistically non-significant. We estimate that a five-unit increase in BMI (e.g., the change between healthy weight and overweight) reduces girls' expectations to complete higher education by 19 percentage points and odds of enrolling in high school by 21 percentage points.

The impact of the control variables

Table 4 reports the IV estimations for the two outcome variables including the complete set of covariates, separately for girls and boys.

Native students are more likely to expect to attend university than students born abroad, with the effect being strong and significant only for boys. Lower cognitive abilities significantly reduce adolescents' expectations to obtain a university degree and aspirations towards post-secondary educational choices representing paths towards tertiary education. The estimated effects are larger for girls than for boys. Boys and girls who spend more time doing homework and consider themselves good at mathematics are more likely to expect to graduate from university and to choose to attend high school.

Students with mothers holding university degrees are more likely to aspire towards higher education and to enrol in high school. Mother's education impacts more of boys' than girls' aspirations and school choices. The effect of father's level of education is weaker. Parents' involvement matters for educational expectations and educational choices of boys but has no impact for girls. Boys, but not girls, who receive help doing the homework have poorer academic expectations. Needing and getting help with homework at these stages of education may point out to existence of certain learning challenges reducing the odds of aspirations towards further studies. Parents' pressure adversely affects girls' school choices and is not significant for boys. Finally, the number of siblings and having siblings who dropped out of school harms both students' expectations to complete university education and the odds to attend high school.

Discussion

This paper examines the relationship between BMI and the expectations to pursue higher education of Spanish adolescents. Using a unique dataset, we are able account for relevant confounding factors, not considered in previous studies. These factors may affect both weight status and educational aspirations, thus, reducing individual unobserved heterogeneity bias. IV models are separately estimated for boys and for girls to account for the endogeneity of BMI.

Table 3
Estimations of the effect of body mass index on educational expectations/aspirations.

		(1) BMI		(2) Endog. test	(3) Under-ident.	(4) Sargan test	(5) Weak ident. test	
		Coef.	s.e.	χ^2	χ^2	χ^2	F	SY (10%)
Girls								
Expect to obtain a university degree	OLS	−0.0078**	0.0039					
	Multilevel	−0.0083**	0.0038					
	IV (BMI)	−0.0369**	0.0157	4.09**	80.19***		84.24	16.38
	IV (BMI, BMI squared)	−0.0381**	0.0157	4.42**	80.71***	0.720	42.37	19.93
Intend to attend high school next year	OLS	−0.0080**	0.0040					
	Multilevel	−0.0086**	0.0040					
	IV (BMI)	−0.0417**	0.0169	5.08**	76.32***		79.96	16.38
	IV (BMI, BMI squared)	−0.0420**	0.0168	5.19**	76.93***	0.025	40.29	19.93
Boys								
Expect to obtain a university degree	OLS	−0.0070*	0.0040					
	Multilevel	−0.0070*	0.0039					
	IV (BMI)	−0.0085	0.0148	0.052	84.38***		89.24	16.38
	IV (BMI, BMI squared)	−0.0081	0.0147	0.042	84.60***	0.210	44.70	19.93
Intend to attend high school next year	OLS	−0.0070*	0.0037					
	Multilevel	−0.0077**	0.0038					
	IV (BMI)	−0.0149	0.0143	0.043	83.20***		87.96	16.38
	IV (BMI, BMI squared)	−0.0156	0.0143	0.051	83.47***	0.915	44.09	19.93

***$P < 0.01$, **$P < 0.05$, *$P < 0.1$. Control variables (birthplace, duration of the survey, learning disabilities and difficulties, students' effort, personality traits, family background and characteristics, school characteristics) are not shown but included in the regressions.
(1) Estimation of the effects of BMI on educational outcomes.
(2) Endogeneity test. H_0: BMI is exogenous.
(3) Under-identification test. Test for the significance of the instruments. H_0: Instruments are not correlated with BMI.
(4) Weak instruments test. H_0: Instruments are weak. (Null hypothesis is rejected if F-value > SY (10%), where SY are Stock-Yogo critical values).
(5) Test for the exogeneity of the instruments. H_0: Instruments are exogenous.
Abbreviations: BMI = body mass index; IV = instrumental variables; OLS.

Table 4
Instrumental variables estimation of the determinants of the expectations to obtain a university degree and the intentions to attend high school next year.

	Expect to obtain a university degree		Intend to attend high school next year	
	Boys	Girls	Boys	Girls
BMI	−0.0085	−0.0369**	−0.0149	−0.0417**
	(0.0148)	(0.0157)	(0.0143)	(0.0169)
Born abroad	−0.1203***	−0.0492	−0.1246***	−0.0335
	(0.0382)	(0.0333)	(0.0375)	(0.0353)
Diagnosed with a learning difficulty	−0.0749*	−0.1971***	−0.1107**	−0.2360***
	(0.0445)	(0.0465)	(0.0437)	(0.0495)
Following some adapted courses	−0.0419	−0.0819***	−0.0877***	−0.1142***
	(0.0335)	(0.0292)	(0.0330)	(0.0309)
Difficulties in understanding teacher	−0.0600***	−0.0558***	−0.0718***	−0.0458**
	(0.0202)	(0.0201)	(0.0199)	(0.0216)
Self-assessed skills in mathematics	0.0488***	0.0298***	0.0443***	0.0310***
	(0.0069)	(0.0059)	(0.0068)	(0.0063)
Self-assessed skills in doing things one dislikes	0.0117*	0.0154**	0.0039	0.0345***
	(0.0062)	(0.0066)	(0.0061)	(0.0070)
Daily hours of doing homework	0.0172*	0.0450***	0.0297***	0.0298***
	(0.0103)	(0.0105)	(0.0101)	(0.0111)
Prefers a variable wage over a fixed wage	0.0410	−0.0346	0.0387	−0.0317
	(0.0282)	(0.0253)	(0.0276)	(0.0268)
Parents help do the homework	−0.0360***	−0.0013	−0.0303***	−0.0054
	(0.0097)	(0.0088)	(0.0095)	(0.0094)
Mother has a university degree	0.2232***	0.0894***	0.2515***	0.0915**
	(0.0377)	(0.0344)	(0.0370)	(0.0365)
Father has a university degree	0.0867**	0.0321	0.0736*	0.0698*
	(0.0394)	(0.0380)	(0.0385)	(0.0404)
Mother is unemployed	−0.0620	−0.0228	−0.0208	−0.0600
	(0.0541)	(0.0510)	(0.0534)	(0.0541)
Father is unemployed	−0.0114	−0.0350	−0.0309	−0.0382
	(0.0467)	(0.0445)	(0.0458)	(0.0471)
Parents' marital status (Ref: Married)				
Divorced/separated	−0.0533	−0.0105	−0.0389	−0.0234
	(0.0328)	(0.0294)	(0.0323)	(0.0313)
Other (Single, widowed)	−0.0644	−0.0003	−0.0237	−0.0235
	(0.0487)	(0.0442)	(0.0474)	(0.0468)
Number of siblings	−0.0052	−0.0361***	−0.0306**	−0.0462***
	(0.0132)	(0.0114)	(0.0131)	(0.0121)
Number of siblings who are school dropouts	−0.0649***	−0.0291	−0.0232	−0.0363
	(0.0246)	(0.0217)	(0.0245)	(0.0230)
Parents pressure on school choices (Ref: Never)				
Sometimes	0.0088	−0.0366	−0.0385	−0.0302
	(0.0334)	(0.0326)	(0.0327)	(0.0346)
Often	−0.0448	−0.0698**	−0.0514	−0.1084***
	(0.0347)	(0.0330)	(0.0341)	(0.0350)
Always	−0.0825*	−0.1416***	−0.0636	−0.1496***
	(0.0502)	(0.0482)	(0.0496)	(0.0510)
Contextual variables (at municipality level)				
Household income	0.1774	−0.0219	0.5135***	−0.0639
	(0.1595)	(0.1340)	(0.1587)	(0.1425)
Unemployment rate	−0.2665	0.6601	0.3156	−0.5695
	(0.6458)	(0.6413)	(0.6401)	(0.6797)
Observations	1250	1317	1233	1300
R-squared	0.1865	0.1444	0.2081	0.1734
School fixed-effects	YES	YES	YES	YES

Standard errors in parentheses. ***$P < 0.01$, **$P < 0.05$, *$P < 0.1$.
Abbreviation: BMI = body mass index.

We find a negative relationship between overweight/obesity and adolescents' expectations to obtain a university degree and post-compulsory educational choices representing paths towards higher studies. That is, our results support the selection hypothesis. We estimate large negative effects for adolescent girls, while no effects are observed for boys.

The results are robust since the estimated effects persist after controlling for a large set of individual and family characteristics and school fixed-effects. Including school fixed-effects allows to account for both unobserved school heterogeneity and peer effects, which are also very pertinent in the school context. Our findings are in line with previous studies that find that most of the association between BMI and educational outcomes is due to selection[12,13,22,26] and is observed only for girls.[2,13,15,22,26]

International empirical evidence, to which we add with the present study, suggests that high-BMI adolescent girls are persistently less likely to complete higher levels of education. However, since different countries may exhibit varying patterns of adolescent overweight/obesity and have distinct educational settings, comparing findings across countries requires caution.

Undoubtedly, further research is needed to determine the mechanisms behind the observed gender pattern. Several factors may limit educational expectations of adolescent girls with a high BMI score. One possibility is that parental attitudes and expectations adversely impact girls' academic aspirations much more than boys'. That is, high-BMI adolescent girls receive less encouragement from their parents and teachers[21] to continue their studies beyond the compulsory secondary education. This discrepancy in

encouragement may be attributed to differences in family environments (e.g., high-BMI girls may come from families with fewer mothers having university education) or parents' gender-based beliefs and perceptions towards their children's educational development and health-related behaviours.

Another possibility is that adolescent girls are more aware of the negative social perceptions of being overweight.[12,26] They are more likely to experience feelings of loneliness, face peer pressure and bullying, develop a negative self-image and low self-esteem, and become more pessimistic about their future. These factors can contribute to increase emotional distress and disengagement with academic activities among girls with a high BMI score, thereby reducing their odds of pursuing higher levels of education.

Conclusions

We provide empirical evidence supporting the selection hypothesis behind the relationship between overweight/obesity and education. That is, unhealthy weight in adolescence strongly hampers girls' aspiration for further education. This finding is very relevant since lower educational aspirations during adolescence may lead to lower academic achievement and hence, to poorer health, labour market outcomes, and well-being during adulthood. Raising awareness among parents and adolescents about the implications of obesity not only on health but also on educational expectations is essential from a policy standpoint.

Additionally, overweight/obesity are shown to be more prevalent among youths from the lower social strata.[27] Thus, policy interventions targeting the health and health-related behaviours of the disadvantaged adolescents or directly aimed at raising young people's aspirations to higher studies may potentially reduce educational inequalities, and adverse socioeconomic prospects later in life.

Finally, our study has some limitations. First, the BMI is self-reported and may be subject to reporting bias. Nevertheless, it is the most widely used indicator to assess unhealthy weight status and is generally considered an appropriate one in children and adolescents.[28,29] In addition, IV models also address misspecification problems caused by measurement errors in the regressors. Second, longitudinal study designs are better suited to explore causal relationships than cross-sectional data. However, we control for peer effects by adding school fixed-effects, i.e., we account for the common characteristics of the school environment and use IV techniques.

Author statements

Ethical approval

This study did not require of ethical approval since it is based on anonymised survey data.

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Competing interests

The authors declare that there are no competing interests.

Authors' contributions

L.D. designed the study and was responsible for the empirical analysis. A.S. and L.D. draughted the manuscript. Both authors have revised and agreed on the final version of the manuscript.

Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.puhe.2023.09.013.

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