Can Teaching Enthusiasm Partially Predict the Reading Attainment of Low-income Students in Secondary Schools in England?

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Abstract

The poverty achievement gap in early reading is a persistent issue in England and around the world, potentially disadvantaging poor students and their further study. This new study employs student-perceived teaching enthusiasm and reading attitudes to help explain the poverty attainment gap. The sample was 5,242 15-year-old participants in PISA 2018 from 175 secondary schools in England. Path analysis is used to investigate the potential effect of teaching enthusiasm on the reading attainment of low-income students. The findings indicate that family socioeconomic status remains an important predictor of students' reading achievement. Students from economically privileged families tend to rate teaching enthusiasm more highly and express a positive reading attitude, which can partially explain the poverty attainment gap in reading. Therefore, teachers might be able to enhance low-income students' reading outcomes and close the poverty attainment gap a little through enhanced teaching enthusiasm to cultivate students' positive reading attitudes.

Keywords: *Perceived teaching enthusiasm; Reading achievement; Secondary education; Education equality; PISA*

Introduction

Reading, a basic skill

Reading is a crucial activity for humans that involves brain function, interpretation, and emotion. Students often learn to read in language classes to expand vocabulary, comprehension, and cultural understanding (Friesen & Haigh, 2018; Nambiar et al., 2020; Soltani, 2011). In secondary school, students are expected to read independently, in order to learn about wider curriculum. Reading proficiency is a crucial factor for evaluating education quality across schools and regions and the attainment gap between low-income and wealthy students can be observed through evaluations of their reading literacy. According to the Programme for International Student Assessment (PISA) framework, the 2018 results of which were used in this present study, reading literacy involves "understanding, using, evaluating, reflecting on, and engaging with texts in order to achieve goals, develop one's knowledge and potential, and to participate in society" (OECD, 2019, p.28).

The Poverty Attainment Gap

On average, students from low-income families are more likely to have lower academic achievement compared with their counterparts from economically more privileged families (Harwell et al., 2017; Sirin, 2005). Middle-class students are supposed to get more learning resources and devote more time to learning, particularly in reading (Greaney & Hegarty, 1987; Johnsson-Smaragdi & Jönsson, 2006). According to PISA's 2018 results, around the world students from the 10% wealthiest socioeconomic groups scored 141 points more in reading than those from the 10% poorest socioeconomic groups (Schleicher, 2019). This kind of disparity occurs in England as well, with the average reading score of free school meal (FSM) eligible students being 39 points lower in PISA 2018 than the figure for Non-FSM students (Sizmur et al., 2019).

School Segregation

School education is expected to make a change in students' learning habits, promote academic outcomes, and enhance education equality. However, teacher quality can differ between schools. Schools in disadvantaged areas are often less attractive for high-quality or more experienced teachers, which leads to school segregation of teacher experience.

In England, a considerable proportion of low-income students enter schools which possess limited learning resources and perhaps more low-effectiveness teachers. Students at these low-SES schools have a higher possibility of being taught by less-qualified, inexperienced, or out-of-subject teachers (Allen & Sims, 2018). This strengthens their lower academic achievement. Wealthy areas tend to have more prestigious schools, creating a positive correlation between family wealth and learning attainment, which increases the cost of housing and further exacerbates school segregation (Gorard et al., 2022).

Moreover, teaching styles, practices, and expectations might differ between working-class students and middle-class students. Kneppers (2022) found from two Norwegian schools that working-class students are more likely to obtain visible pedagogic practices than middle-class students. Some economically disadvantaged students have even suffered unfairness from prejudiced teachers who had lower expectations and provided less assistance for them (Gorard & Smith, 2010).

Teachers' Enthusiasm Matters

Teachers' enthusiasm represents an aspect of teacher-student interaction quality which attracts attention from researchers, teachers, and school leaders as a malleable factor of teaching. Students can perceive teachers' enthusiasm in classroom interaction, which potentially contributes to their learning attitude and outcomes (e.g. Rogiers et al., 2020; Roorda et al., 2017). When teachers demonstrate excitement and passion for reading, students are more likely to feel inspired and curious about the topic. The combined emotional and motivational atmosphere created by the teacher's enthusiasm and the students' engagement is referred to as a shared affective-motivational climate (Gaspard & Lauermann, 2021). It has been observed in a recent systematic review that a positive learning attitude in students is often associated with higher levels of achievement (Camacho-Morles et al., 2021). A meta-analysis stated a moderate positive association between reading attitude and attainment (Petscher, 2010). If students feel motivated and interested in the material, they are more likely to invest time and effort into reading and comprehension. This, in turn, can have a positive impact on their reading

achievement. Moreover, students' prior reading achievement could predict their enjoyment of reading in further study and their later life (Toste et al., 2020).

However, while previous studies have investigated the correlation between socioeconomic status, reading attainment, teachers' enthusiasm, and students' reading achievement, they usually treated the correlation as a 'black box', which ignores the interaction between these variables. A few studies have focused on the specific path in which low-income students' academic outcomes are predicted by their perceptions of teacher enthusiasm. Additionally, whether high-rated teaching enthusiasm makes a difference to low-income students' reading attitude and performance is still unclear. Some studies suggest that teacher characteristics and classroom interaction may not be predictors of low-income students' attainment (Jepsen, 2005; Xuan et al., 2019).

If student-perceived teaching enthusiasm could partially explain the poverty attainment gap, teachers and school leaders could try to address the gap in daily classroom interaction. Teachers could adjust their teaching approach to improve students' perception of teachers' enthusiasm. This adjustment would not require much time or energy of teachers and would not be harmful to students.

This new study employs data from PISA 2018 in England to describe the reading attainment gap between extremely poor students and their counterparts with better economic backgrounds. Then the research examines to what extent teachers' expression of enthusiasm could make a difference in the reading outcomes of economically disadvantaged students. In addition, the study also investigates the importance of reading attitude for reading proficiency.

Research Questions

The research questions of this study are:

(1) What is the difference in leisure reading time between extremely poor students and higher-income students in England?
(2) How large is the early reading attainment gap between extremely poor students and higher-income students in England?
(3) To what extent, could student-perceived teaching enthusiasm make a difference to reading attainment of low-income students in England?

Design and Method

The research uses an overall cross-sectional design to illustrate a 'snapshot' of students who were 15 years old in 2018 in England. The research compares the leisure reading time and average reading scores between low- and high-SES students. Cohen's d "effect" sizes are calculated to indicate the potential impact of family socioeconomic status on reading proficiency of secondary school students in England. Then, teaching enthusiasm is measured by four items in the PISA student questionnaire. Path analysis is employed to investigate the mechanism of how teaching enthusiasm works with low-income students' reading attitudes and proficiency.

Sample

The samples in this research are downloaded from the PISA 2018 dataset on the website of OECD. The original dataset includes some 600,000 students from 79 countries and economies. This research only focuses on students in England, therefore, involving 5,242 students (2,554 males, 2,688 females) from 175 schools with the region code '82611'. The majority of students who completed the assessment are in grade 11 at age 15.

Variables

Variables in this study include students' socioeconomic status (SES), teaching enthusiasm, reading attitude, leisure reading time, and standard reading scores. SES, student-perceived teaching enthusiasm, and reading attitude are selected as three predictors of reading proficiency.

SES

PISA employs the index of economic, social, and cultural status (ESCS) as a measure of students' socioeconomic status. The larger the index is, the more economic, social, and cultural resources the individual owns. This index is calculated as the arithmetic mean of three

components including the highest parental employment status, the highest parental educational qualification, and household possessions (OECD, 2020). In England, the average SES is +0.28 in 2018 (Sizmur et al., 2019).

Teaching Enthusiasm

Teaching enthusiasm is a latent variable which cannot be measured directly. In this study, teaching enthusiasm refers to student perception of teaching enthusiasm which indicates teachers' enjoyment of teaching and inspiration to students according to students' perception. PISA 2018 employed a four-point Likert Scale ranging from 'Strongly disagree' to 'Strongly agree' to measure teaching enthusiasm based on four items. All data are collected in the students' self-report questionnaire. The items are shown in Table 1.

Table 1 Items in Teaching Enthusiasm

Dimension	**Items**
Teaching Enthusiasm	It was clear to me that the teacher liked teaching us.
	The enthusiasm of the teacher inspired me.
	It was clear that the teacher likes to deal with the topic of the lesson.
	The teacher showed enjoyment in teaching.

Reading Attitude

PISA measures students' reading attitude based on their joy of reading. Five four-point items from strongly disagree to strongly agree are used in the student reading attitude scale to estimate the joy of reading. Items based on how much a student agrees the statements such as 'I read only if I have to', 'Reading is one of my favourite hobbies', 'I like talking about books with other people', 'For me, reading is a waste of time', and 'I read only to get information that I need'. All statements could reflect students' engagement and enjoyment of reading.

Leisure Reading Time

Leisure reading time usually refers to extra-curriculum time that students spend in reading automatically. Students answer the question 'About how much time do you usually spend reading for enjoyment?' to tell their leisure reading time. The question does not require a specific time of reading but has categories of five degrees including 'I do not read for enjoyment', '30 minutes or less a day', 'More than 30 minutes to less than 60 minutes a day', '1 to 2 hours a day', and 'More than 2 hours a day'. This study compares the percentage of students who have leisure reading habits and re-categorises students to 'spend no time on leisure reading' and 'spend some time on leisure reading'.

Reading Attainment

This study uses standardised test score of reading in PISA 2018 to evaluate students' reading outcomes. Students' reading attainment is measured by a standard reading test in PISA 2018. The PISA 2018 innovatively used the multi-stage adaptive approach to evaluate students' reading proficiency (OECD, 2019). The system evaluates individuals' reading scores automatically and matches test items to students according to students' performance in prior items. The difficulty level of test items could be adjusted based on students' capacity, which calculates students' reading proficiency adequately.

Data analysis

The study first handled missing data in the dataset. The overall response rate of PISA 2018 in England is 83.2% (Sizmur et al., 2019). Students who refuse to participate in the assessment are excluded from the published dataset, therefore, this research only deals with missing values within each existing case. The research only picks up students who complete most of the survey and participate in the reading test. Missing values in student survey items are replaced by the mean score of the item. 4868 cases (Female=2530, Male=2338) are valid in this research. Gender, average age, average SES, and the mean reading score of cases in the research are reported in Table 2.

Table 2 Characteristic of dataset

Variables	**Mean**
Age	15.8

SES	0.26
Reading Score	509.4

With this cleaned dataset, students are categorised into the 90%-highest SES group and the 10%-lowest SES group to compare the leisure reading time and the mean reading score. A cross-tabulation indicates the link between SES level and time of reading for enjoyment. Mean reading scores and standard deviations of two separate groups are reported. Cohen's d is calculated to measure how large the potential effect of SES is.

While the prior step describes the reading habit and attainment of extremely poor students, the next step explains this attainment gap from teaching enthusiasm with path analysis. The mediation role of teaching enthusiasm is hypothesised in the following Figure 1. The hypothesis states that the reading score is predicted by SES and teaching enthusiasm, while teaching enthusiasm is predicted by SES at the same time. Low-income students might experience low-quality teaching enthusiasm in test language lessons, therefore, achieve a lower score on the standard test.

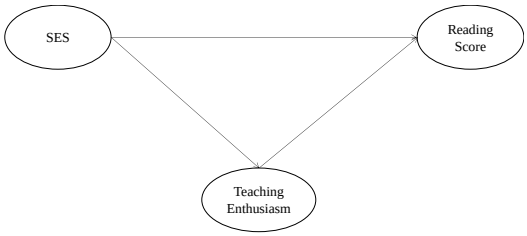

Figure 1 Hypothesised Mediation Model

Taking a further step, students reading attitude is assumed to be a potential predictor of reading scores and might be associated with teaching enthusiasm. Figure 2 proposes the hypothesised model with consideration of reading attitude.

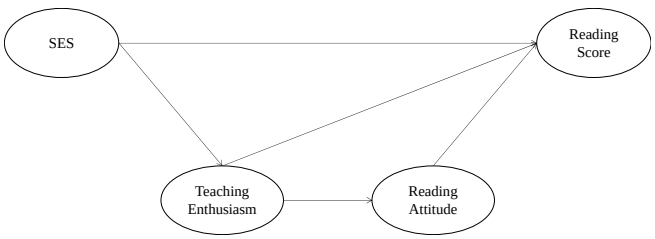

Figure 2 Hypothesised Serial Mediation Model

There are inevitable missing cases in the sampling, as well as missing values from existing cases. PISA data is not a randomised sample, the p-values and similar approaches are not possible here. This study judges the reliability and interpretability of models with standardised path coefficients and ΔR^2. The standardised path coefficients represent the importance of the predictive variables. The larger the coefficient is, the larger variance of the reading score could be made by the predictive variable. The coefficient of determination R^2 presents the fitness of variables in terms of explaining students' reading scores. This study records and compares R^2 in each step. If $\Delta R^2 > 0$, the added variable could increase the model's explanatory power to predict students' reading attainment, which is evidence of model existence.

Findings and Discussion

The results of this research illustrate the reading attainment gap between extremely poor students and their counterparts in secondary school education in England. The study also suggests a likely role for teaching enthusiasm and reading attitude in reading proficiency.

Poverty Attainment Gap in Reading

The findings from descriptive analysis suggest the difference of leisure reading time and reading attainment between low- and high-income students in England. Leisure reading time is an indicator of students reading habits during extra-curriculum time. A student who spends more time reading for enjoyment is more likely to possess an autonomous reading habit and devote more time to reading practice. 4,835 students answered the question 'About how much time do you usually spend reading for enjoyment'. The percentage of students who spend some time on leisure reading from each SES group is reported in the following Table 3.

Table 3 Family Circumstance and Leisure Reading Time in England

	Students who have leisure reading habit **%**

SES	Lowest-10%	42
	Highest-90%	53
	Overall	52

Only 52% of the students spend some time on extra-curriculum reading, which suggests that almost half of the students do not read for enjoyment at all. Leisure reading time is more limited for those extremely poor students than their counterparts from higher-income families, which is supported by prior studies (e.g.Greaney, 1980; Johnsson-Smaragdi and Jönsson, 2006). A higher proportion (53%) of high-SES students have extra-curriculum reading habits, compared with the low-SES group (42%).

The PISA 2018 reading test scores of 4868 students in England vary from 207 to 809 with a mean score of 509. To measure the reading attainment for extremely poor students, Table 4 illustrates the average reading scores of two groups and Cohen's d 'effect size'.

Table 4 Reading Attainment and Family Circumstance in England

		Reading Score			**Effect Size**
		Mean	S.D.	N	Cohen's d
SES	Lowest-10%	456	95	489	0.62
	Highest-90%	516	97	4,379	
	Overall	509	98	4,868	

According to Table 4, the lowest-10% students achieve sixty points lower than the highest-90% students on average with a medium effect size (0.62). Extremely low-income pupils may struggle to get the same reading proficiency as other students from more affluent backgrounds. The reading attainment gap in this study is consistent with earlier studies in terms of the SES

attainment gap in developed countries (Buckingham, Wheldall, and Beaman-Wheldall, 2013; Hemmerechts, Agirdag, and Kavadias, 2017).

How to close the gap is perhaps the more essential issue. The study focused on teaching enthusiasm and reading attitude to construct a mediation model to explain the poverty attainment gap and bridge it.

Teaching Enthusiasm Matters

The research employs a path analysis approach to investigate the inter-relationship among socioeconomic status, teaching enthusiasm, and reading scores and explain the poverty attainment gap with teaching enthusiasm. As shown in Figure 3, the study first constructs the direct path between SES and reading attainment. The standardised coefficient on the arrow (0.293) illustrates that students from high-SES families are more likely to achieve a higher reading score on average with a foundational R^2 of 0.092. Socioeconomic status still contributes to the explanation of 9.2% of the variation in reading ability.

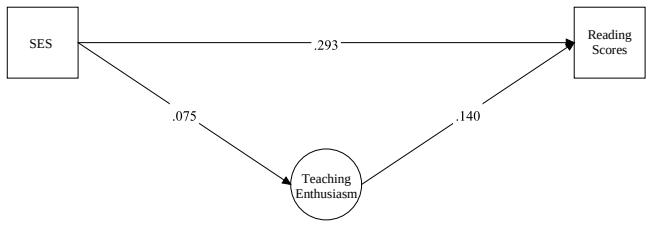

Figure 3 Mediation of Teaching Enthusiasm

When adding the variable of teaching enthusiasm, the R^2 reaches 0.112, which confirms that teaching enthusiasm increases the model explanatory power for reading proficiency. The positive path coefficient of 0.140 suggests that students who rate a higher teaching enthusiasm achieve higher reading proficiency. This variable has a small positive correlation with SES with a coefficient of 0.075, which suggests that socioeconomically privileged students report a higher quality of perceived teaching enthusiasm. Students from low-income families are more likely to experience low-rated enthusiasm teachers. This correlation could be interpreted in two ways. On one hand, students may notice the difference in teachers' enthusiasm for economically disadvantaged students and privileged students (Diamond et al., 2004; Gast, 2018; Smith and Gorard, 2005). On the other hand, there may be a mismatch between teachers'

expression of enthusiasm and students' requirements depending on the nature of the classroom. The high-quality and high-efficacy classroom interaction has the pre-request of teachers' empathy (Aldrup et al., 2022). Even if some teachers have the awareness to express their teaching enthusiasm, the way they express it has potential impacts on students' perceptions of teaching enthusiasm.

Focus on Reading Attitude

Although Figure 3 explains the SES reading attainment gap with teaching enthusiasm, the mechanism of teaching enthusiasm is still in a black box. Several previous studies discovered a substantial relationship between reading attitude and performance (e.g. Lerang et al., 2019; Rogiers et al., 2020). Meanwhile, past research has revealed that teacher-student interaction can foster students' reading attitudes (Guay, Stupnisky, Boivin, Japel, and Dionne, 2019; Roorda, Jak, Zee, Oort, and Koomen, 2017). This study takes a further step to analyse how teaching enthusiasm makes a difference to reading scores with students' reading attitudes. The second hypothesis of the study is explored whether teaching enthusiasm and reading attitudes have a serial mediation on reading proficiency as shown in Figure 4.

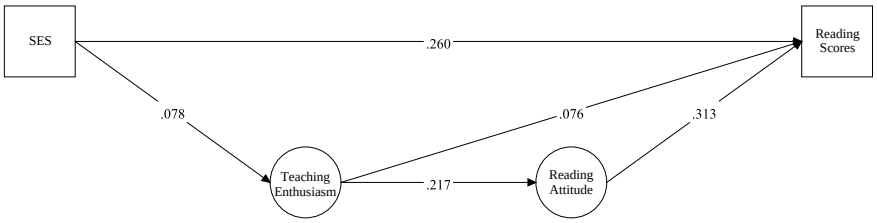

Figure 4 Serial Mediation Model of Teaching Enthusiasm and Reading Attitude

R^2 in this model is 0.187, which means that the model explains about 19% of the variation in reading scores. Students' self-reported reading attitude is the strongest predictor of their reading scores with the largest coefficient of 0.313, compared with SES (0.260) and teaching enthusiasm (0.076). Students who perceive high-quality teaching enthusiasm tend to express a positive reading attitude, which improves their reading test outcomes. Students from higher socioeconomic backgrounds who have highly rated teacher enthusiasm have a more favourable attitude about reading and perform better on standardised reading examinations. In other words, the present research could form the basis of a strategy for raising low-income students'

reading levels by improving their attitude toward reading by delivering high-quality teaching enthusiasm.

Limitations

The study's findings only on a (large) subset of 15-year-old students in England. Some students who refused to participate in the PISA might suffer a super-deprived situation. At this point, the reading achievement gap between rich and poor students may be even greater. In addition, this study used a cross-sectional design to establish a link between teaching enthusiasm and reading proficiency. However, teaching enthusiasm and reading attitude may not be necessary or sufficient to improve students' reading proficiency. Further research should be conducted with randomised controlled trials to demonstrate a firmer causal conclusion (Gorard, 2013). The findings should therefore be interpreted with the necessary caution since this study is not reported as being definitive. However, it makes a substantial contribution to the field, and the implication that can be gained are discussed in the next section.

Implications

According to the current study, the socioeconomic achievement disparity might be partially explained by teachers' excitement. For educational practice, three recommendations are proposed.

First, teachers and schools should provide students with adequate reading materials so that low-income students have the opportunity to get extra-curriculum reading experience. Secondly, all teachers should cultivate their empathy to focus on low-income students' requirements with consideration of their growing environment. Thirdly, students' reading attitudes showed a strong predictive power to reading attainment in secondary schools.

Therefore, teachers need to foster students' positive reading attitudes. However, all of these implications are based on certain teaching approaches which should be decided by teachers themselves with consideration of students' status. In educational research, a great number of studies in terms of classroom interaction in reading are accumulating, which could guide teachers' classroom practice. The next step should focus on how to transform these bodies of research evidence into practice.

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