






Exploring the interplay between socioeconomic status and reading achievement: An expectancy-value perspective

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Background. Socioeconomic status (SES) and motivation are both important predictors of student achievement. However, most studies have investigated these factors separately, and very few have looked into the interplay between SES and motivation as determinants of student reading achievement.

Aims. We intend to bridge this gap by examining a model of SES predicting reading achievement through motivation (i.e., expectancy and value) at both student and school levels.

Sample. We used the data from the Programme for International Student Assessment (PISA) 2018 of 26,281 students from four regions in Greater China (Mainland China, Hong Kong, Macau, and Taipei).

Methods. We used multi-group multilevel path analysis to test whether SES would predict reading achievement mediated by expectancy and value in student and school levels across four regions, with gender as a covariate.

Results. Results showed that at the student level, SES significantly predicted reading achievement indirectly through both expectancy and value across four regions. At the school level, the relationship between school SES and school reading achievement was most direct.

Conclusion. The study was able to demonstrate the motivational gap as a pathway in which economic inequality can contribute to students' reading achievement gap.

Improving the reading achievement of adolescents is important to prepare them for college and careers (Theroux, 2010). Unfortunately, declines in voluntary reading behaviour and reading performance across grade levels have been observed (Rampey,

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Dion, & Donahue, 2009). Multiple factors and processes are involved in shaping reading achievement in adolescents. One body of work has focused on the role of economic resources, particularly family socioeconomic status (SES) and school SES, in predicting reading achievement (e.g., León, Álvarez-Álvarez, & Martínez-Abad, 2020; Yang Hansen, Rosén, & Gustafsson, 2011). Another pertinent body of work looks at the role of individual differences in motivational factors (e.g., Durik, Vida, & Eccles, 2006; Wigfield & Eccles, 2000). However, to date, these two research areas have proceeded in parallel, with little cross-over of ideas. By bridging these two disciplines together and examining the interplay between SES and motivation at both student and school levels, this study aims to provide a better understanding of each other's role in determining students' reading achievement.

To date, a substantial body of research has established the strong impact of family resources on reading achievement in adolescents (Guthrie, Klauda, & Ho, 2013; Schiefele et al., 2012). A better understanding of the interplay between family SES and reading motivation in influencing students' reading achievement could enable researchers and practitioners to develop effective literacy programmes for adolescents. In addition, examining how these factors relate at the school level may have implications for policy decisions. Hence, this study could provide a substantial contribution to the field not only by examining the synergies between SES research and motivation research but also by employing a multilevel approach, whereas most studies have focused only on the student level. This could provide a better picture of how these factors relate at the school level, which could serve as a valuable input in the development of school policies that aim to support students' reading achievement. Moreover, while most studies on the role of SES and motivation on reading achievement involve samples from Western countries, this study particularly focuses on four territories from Greater China, namely Mainland China (Beijing-Shanghai-Jiangsu-Zhejiang), Hong Kong SAR, Macau SAR, and Taiwan.

SES and reading achievement

A large body of research has shown that students' family SES is an important predictor of reading achievement across cultural contexts (Chen, Kong, Gao, & Mo, 2018; Chiu & McBride-Chang, 2006; Hoff, 2013; Noble, Farah, & McCandliss, 2006; Su et al., 2017). This relationship also holds in the Chinese context. For example, Su et al. (2017) followed Chinese children from kindergarten to the end of primary school to examine the predictive power of family resources for reading. They found that family SES was significantly associated with literacy outcomes. Chen et al. (2018) reported similar findings in a large sample of middle-school students in China.

Aside from family SES, school SES could also play an important role in students' reading achievement. Examining the school SES and reading achievement can shed light on how ecological settings in schools affect reading development. Previous studies have looked into several school characteristics in influencing achievement outcomes, such as school poverty, school size, and school-level parental involvement, among others (McConney & Perry, 2010; Park, Stone, & Holloway, 2017; Ransdell, 2012). Currently, research has shown that SES or poverty at the school level is significantly associated with reading achievement in both elementary and middle schools (Armor, Marks, & Malatinszky, 2018; Mandeville, 1988). However, the mechanisms in which SES influences reading achievement remain to be fully understood. We propose motivation as one of the pathways through which SES could predict reading achievement.

Motivation and reading achievement

Motivation to read is strongly predictive of reading achievement in adolescents (Alvermann, 2002; Guthrie & Wigfield, 2000). Most of the studies have measured a constellation of motivational factors, without utilizing a specific motivational framework. The current study examines reading motivation through the lens of expectancy-value theory, as it has been successfully used to understand motivation in different academic contexts (Wang, Degol, & Ye, 2015; Wigfield & Eccles, 2000).

The expectancy-value theory of motivation (Eccles et al., 1983; Wigfield & Eccles, 2000) focuses on the students' expectancies for success (Can I do it?) and value (Why do I want to do it?) for reading. Competency-related beliefs of students such as their reading self-efficacy are demonstrated to predict reading achievement (Wigfield & Eccles, 2000). Similarly, students' value for reading is predictive of the amount of time they spent reading, as well as their reading performance (Durik et al., 2006).

In this study, we conceptualize expectancy of success in reading as reading self-efficacy and value as enjoyment of reading. Reading self-efficacy is the belief that one can organize and execute actions to achieve reading success. It is a type of expectancy belief in the reading domain (Wigfield & Eccles, 2000). For the value of reading, we measured the intrinsic value of reading, which refers to the enjoyment experienced while engaging in reading (Wigfield & Eccles, 2000). Previous studies have shown that both expectancies in reading (Wigfield & Cambria, 2010) and intrinsic value of reading (Durik et al., 2006; Wigfield, Tonks, & Kluda, 2016) predict reading achievement in adolescents. For instance, Cantrell, Rintamaa, Anderman, and Anderman (2018) found that Grade 8 students' expectancy for success and intrinsic value for reading significantly predicted their reading comprehension scores. Wolters, Denton, York, and Francis (2014) similarly reported that reading-specific expectancy beliefs (self-efficacy) and value are significantly associated with reading achievement in adolescents ranging from Grade 7 to Grade 12.

To what extent expectancy-value and reading achievement are associated at the school level remains unexplored. Such investigation is meaningful because school-level motivational factors reflect the educational ecology of individual students (Martin & Lazendic, 2018). Indeed, past studies that have employed school-level data have demonstrated how school climate influence students' motivation and achievement (e.g., Maxwell, Reynolds, Lee, Subasic, & Bromhead, 2017; Niederkofler, Herrmann, Seiler, & Gerlach, 2015). With the increased understanding of school factors in promoting motivation, the findings of this study may have important implications on the role of a learning environment conducive to reading expectancy and value beliefs.

It has been postulated that expectancy-value variables are influenced by the social environment, such as SES (Eccles, 2007). However, most research examines SES and motivation separately; and although a few studies have examined the relationship among these variables in the general academic achievement (e.g., Alivernini & Lucidi, 2011), little attention has been paid to understanding how these factors operate in the reading domain at both individual and school levels. Therefore, the present study aims to mitigate this research gap by examining the motivational mechanisms behind the relationship between SES and reading achievement using secondary data from 26,281 15-year-old students from four Chinese-speaking regions.

Motivation as mediator in the relationship between SES and reading achievement

As shown in the literature, there is a strong relationship between SES and reading achievement at individual and school levels (e.g., Armor et al., 2018; Chen et al., 2018).

Conceivably, the influence of SES on reading achievement can be indirect. SES can initiate changes in individual, family, and school characteristics, which in turn contribute to reading outcomes. Indeed, previous studies have demonstrated that students' SES influences reading achievement via executive functions (Lawson & Farah, 2017), cognitive-linguistic skills (Zhang & Seepho, 2013), and parental beliefs, expectations, and involvement (Guo et al., 2018).

Relatively fewer studies have examined the influence of SES on reading achievement via motivational factors. Shin and So (2018) found a relationship between SES and motivation among adolescents, which affects their use of learning strategies. Low SES adolescents who draw only on intrinsic motivation were likely to rely on the use of social strategies. On the other hand, high SES adolescents tended to have higher levels of effort, mastery goal orientation, and internal control and, in consequence, showed greater use of cognitive, metacognitive, compensatory, and social strategies in learning. In another study, Tucker-Drob and Harden (2012) demonstrated that SES could influence students' motivational dispositions as it facilitates the processes by which they select, evoke, and attend to their learning experiences. Another way SES could influence motivation and learning is through its influence on the parent-child relationship. Family SES reflects the social and economic resources that parents can provide their children, as well as their relationship with their children, which could facilitate better learning outcomes. Hence, higher SES can foster students' motivation and better learning (Chen et al., 2018).

We argue that reading expectancy-value beliefs are potential mediators. A study by Kraus, Piff, Mendoza-Denton, Rheinschmidt, and Keltner (2012) has demonstrated that social class is linked to a greater sense of self-control, providing support for the influence of SES on one's self-efficacy or expectancy. Moreover, social class or family background is considered to be influential in the formation of these expectancy-value beliefs (Eccles, 2007).

Empirically, Troyer, Kim, Hale, Wantchekon, and Armstrong (2019) reported that SES had significant relationships with intrinsic motivation among a large sample of fifth graders in the United States. Similarly, Guthrie et al. (2013) found that SES was significantly associated with reading self-efficacy and value for reading in English-speaking seventh graders. As outlined earlier, these motivational factors are also significantly associated with reading achievement in adolescents. Therefore, in this study, we hypothesize that reading expectancy and value are significant mediators of the relationship between SES and reading. To our best knowledge, no prior study has examined such motivational mechanism underlying the relationship of SES and reading achievement at individual and school levels.

The present study

SES, reading-related expectancy-value variables, and reading achievement are significantly associated in adolescents. However, these relationships have usually been investigated in the literature separately. Moreover, past studies have not systematically examined the interplay and mechanisms of the associations among these variables at the individual and school levels simultaneously.

With SES as a broader social environmental factor, we hypothesize that motivational factors would significantly mediate the effects of SES on reading achievement. At the individual student level, we argue that students with higher SES would have higher levels of reading self-efficacy and value for reading, which in turn lead to higher reading achievement (H_1). At the school level, higher SES schools would have overall higher levels

of reading self-efficacy and value for reading among students, which translates to higher school reading achievement (H_2).

Some studies have shown such mechanisms in general academic outcomes (Steinmayr, Dinger, & Spinath, 2012; L. Wang & Finch, 2018). However, no prior study has examined such mechanisms in the reading domain. We have used non-Western secondary data to test the hypothesized relations. Therefore, this study may also contribute to the understanding of social-motivational factors in influencing reading achievement in non-Western contexts.

There is ample literature that shows that gender influences motivation and reading achievement. In particular, most studies have revealed that girls are often more motivated and do better in the reading domain (e.g., Chiu & McBride-Chang, 2006; Meece, Glienke, & Burg, 2006; Nalipay, Cai, & King, 2020). Thus, we included it as a covariate in our analysis to control for its effects.

In the present study, we answered the following research questions:

1. To what extent does students' SES predict reading achievement through expectancy and value across Mainland China, Hong Kong, Macau, and Taipei?
2. To what extent does school SES predict school reading achievement through school expectancy and value across Mainland China, Hong Kong, Macau, and Taipei?

Method

Data

The current study used the Organisation for Economic Co-operation and Development (OECD) Programme for International Student Assessment (PISA) 2018 data (OECD, 2019a) of 26,281 adolescents from four territories in Greater China: Mainland China (Beijing-Shanghai-Jiangsu-Zhejiang; 41.6%), Hong Kong (19.9%), Macau (13.3%), and Taipei (25.1%). The mean age of the participants was 15.78 ($SD = 0.29$) years. The sample was composed of 49% girls and 51% boys.

Measures

Student-level variables

Expectancy and value were measured each with a 4-point scale ranging from 1 (*strongly disagree*) to 4 (*strongly agree*). The items are presented in Table 1. *Expectancy* (i.e., self-efficacy) consists of three statements addressing the self-concept of reading. *Value* (i.e., enjoyment of reading) was represented by five statements addressing the enjoyment of reading. Both scales showed adequate internal consistency (see Table 1) for all four groups, and the results of invariance measurement suggested that both scales showed weak measurement invariance across the four groups (i.e., equal factor loadings; see Table S1).

SES was represented by the economic and social culture status (ESCS) indicator of the PISA 2018 dataset. The ESCS is a standardized composite score accounting for information regarding students' family background (e.g., number of books at home, parents' education, and occupation, among others; OECD, 2019b).

Reading achievement was based on students' reading achievement scores in PISA 2018. Reading literacy in PISA was defined as "an individual's capacity to understand, use, evaluate, and reflect on and engage with texts to achieve one's goals, develop one's knowledge and potential, and participate in society" (OECD, 2019b, p. 14).

Table 1. Items of the scales and descriptive statistics

	Mainland China (n = 10,805)		Hong Kong (n = 5,180)		Macau (n = 3,475)		Taipei (n = 6,495)	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD
ST161Q01. I am a good reader	2.90	0.68	2.63	0.77	2.50	0.80	2.67	0.83
ST161Q02. I am able to understand difficult texts	2.66	0.68	2.55	0.73	2.43	0.70	2.38	0.77
ST161Q03. I read fluently	3.18	0.58	2.94	0.67	2.85	0.66	2.75	0.75
Expectancy	2.89	0.47	2.78	0.47	2.71	0.46	2.78	0.52
	$\alpha = .78$		$\alpha = .82$		$\alpha = .73$		$\alpha = .82$	
ST160Q04. I read only if I have to ^a	3.34	0.72	2.60	0.88	2.59	0.87	2.54	0.87
ST160Q05. Reading is one of my favourite hobbies	3.12	0.71	2.67	0.84	2.65	0.83	2.70	0.83
ST160Q06. I like talking about books with other people	2.95	0.74	2.45	0.80	2.44	0.77	2.55	0.80
ST160Q07. For me, reading is a waste of time ^a	3.59	0.61	3.11	0.82	3.14	0.78	3.06	0.83
ST160Q08. I read only to get information that I need ^a	2.94	0.81	2.59	0.86	2.50	0.88	2.57	0.88
Value	3.19	0.55	2.68	0.64	2.66	0.64	2.68	0.66
	$\alpha = .81$		$\alpha = .82$		$\alpha = .83$		$\alpha = .84$	
Reading Achievement	560.28	88.78	531.51	95.29	526.70	91.89	499.79	99.77
SES	-0.46	1.03	-0.62	0.94	-0.56	0.85	-0.39	0.86

^aResponses to these negative statements were reversed before computing means and Cronbach's alphas.

School-level variables

School-level variables, namely: school expectancy, school value, school SES, and school reading achievement, were represented by the aggregates of the student-level expectancy, value, SES, and reading achievement, respectively.

Data analysis

Before the primary data analysis, we computed the intraclass correlation (ICC; Barcikowski, 1981) of the outcome variables at the school level to check the need for conducting multilevel analysis. The ICCs for reading, expectancy, and value were .313, .032, and .048, respectively, all greater than zero, suggesting the need for conducting multilevel analysis (Heck & Thomas, 2015). Hence, multi-group multilevel path modelling was used to analyse the data. At the student level, reading was regressed on expectancy, value, SES, and covariate gender, while expectancy and value were regressed on SES and covariate gender. At the school level, school reading achievement was regressed on school expectancy, value, and SES, and school expectancy and value were regressed on school SES.

Data were analysed using Mplus Version 8.2 (Muthén & Muthén, 2018) software, with maximum likelihood robust (MLR) estimator (Satorra & Bentler, 1994). The following criteria were used to evaluate the quality of the model-data fit: root mean square error of approximation (RMSEA), standardized root mean square residual (SRMR), Tucker–Lewis index (TLI), and comparative fit index (CFI). RMSEA and SRMR smaller than .05 and CFI and TLI greater than .95 were considered as excellent fit (Mueller & Hancock, 2010).

Supplementary analyses

We conducted supplementary analyses to provide more information about the relationships among SES, motivation, and reading achievement. Separate correlation matrices among the variables were provided across the four regions, with the data separated into low/high SES and low/high reading ability through the median split. Moreover, given that there is literature supporting the impact of reading achievement on reading and motivation (e.g., Erbeli, Bergen, & Hart, 2020), we also conducted supplementary analyses on an alternative model with reading achievement as the mediator and motivation as the outcome.

Results

Descriptive statistics

Table 1 shows the means and standard deviations, while Table 2 presents the correlations of the key variables and covariate of the study across the four regions at the student level. Across all regions, reading achievement was positively associated with expectancy, value, and SES, whereas girls have higher reading achievement. SES was positively associated with expectancy and value. Table 3 shows the correlations of the key variables at the school level. A similar pattern of relationships was observed.

Multi-group multilevel path modelling

The four-group multilevel path model fit the data perfectly (RMSEA = 0.000, SRMR = 0.000, CFI = 1.00, and TLI = 1.00). Figure 1 shows the standardized estimates

Table 2. Correlations of the study variables (student level)

	Mainland China/Macau					Hong Kong/Taipei				
	1	2	3	4	5	1	2	3	4	5
1. Reading Achievement	—	.302**	.302**	.125**	-.120**	—	.391**	.386**	.344**	-.096**
2. Expectancy	.226**	—	.637**	.153**	-0.0326	.271**	—	.637**	.235**	-.075**
3. Value	.312**	.606**	—	.114**	-.162**	.281**	.611**	—	.207**	-.186**
4. SES	.376**	.273**	.195**	—	-.065**	.197**	.156**	.125**	—	0.006
5. Gender	-.076**	-.027**	-.150**	-.023*	—	-.144**	-.058**	-.162**	-.082**	—

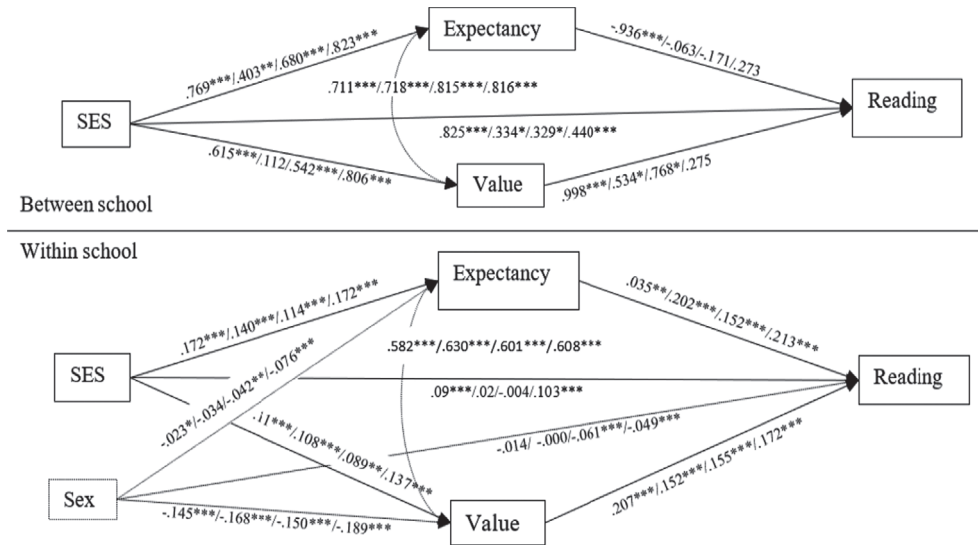
Note. * $p < .05$, ** $p < .01$.

Table 3. Correlations of the study variables (school level)

	Mainland China/Macau				Hong Kong/Taipei			
	1	2	3	4	1	2	3	4
Reading Achievement	—	.461**	.599**	.407**	—	.731**	.777**	.810**
Expectancy	.510**	—	.725**	.263	.486**	—	.775**	.659**
Value	.672**	.685**	—	.353*	.628**	.621**	—	.652**
SES	.696**	.708**	.504**	—	.583**	.381**	.388**	—

Note. * $p < .05$, ** $p < .01$.

Two-level Path Model with Standardized Estimates



Note: * $p < .05$, ** $p < .01$, *** $p < .001$; standardized estimates for Mainland China-Macau-Hong Kong-Taipei

Figure 1. Two-level path model with standardized estimates. Note: * $p < .05$, ** $p < .01$, *** $p < .001$; standardized estimates for Mainland China–Macau–Hong Kong–Taipei.

of the model, while Table 4 shows the direct, indirect, and total effects. The effect sizes (R^2) can be found in Table S10. At the student level, the significant positive direct effect of SES on reading achievement was found in Mainland China and Taipei, whereas SES consistently significantly and positively predicted reading achievement indirectly through both expectancy and value in all four regions. At the school level, school SES positively predicted school reading achievement directly in all four regions. No significant indirect effects were found, except in Mainland China, where school SES negatively predicted school reading achievement through school expectancy and positively through school value. However, upon further examination, the negative mediation of school expectancy seems to be merely a suppressor effect of school value, as indicated by the sign reversal of the school level bivariate correlations (see Table 3) in the multivariate model. The findings of the study provided support for our hypothesis at the student level (H_1 : students with higher SES would have higher levels of reading self-efficacy and value for reading, which predict higher reading achievement) but not at the school level (H_2 : higher SES

Table 4. Total, direct, and indirect effects of SES on reading achievement

		Direct effect on reading				Indirect effect	
		Total	From SES	From expectancy	From value	By expectancy	By value
Mainland China	Student	.11*	.09*	.04**	.21**	.01**	.02*
	School	.72*	.83*	-.94*	1.00*	-.72*	.61*
Macau	Student	.06**	.02	.20*	.15*	.03*	.02*
	School	.37**	.33*	-.06	.53*	-.03	.06
Hong Kong	Student	.03	-.004	.15*	.16*	.02*	.01*
	School	.63*	.33*	-.17	.77*	-.116	.42
Taipei	Student	0.16*	.103*	.21*	.17*	.04*	.02*
	School	.89*	.44*	.27	.28	.23	.22

Note. * $p < .05$, ** $p < .01$.

schools would have overall higher levels of reading self-efficacy and value for reading among students, which predict higher school reading achievement).

Supplementary analyses

We also compared mean differences among the critical variables (expectancy, value, SES, and reading achievement) using a multivariate analysis of variance (see Tables S1.1 and S1.2). For more information about the relationships among the variables, see also the results of the supplementary analyses. Correlation matrices were provided where the data were separated for low/high SES (Tables S3–S6) and low/high reading ability (Tables S7–S10).

We also conducted a supplementary analysis based on an alternative model where motivational constructs such as expectancy and value are posited as the outcomes of the model (see Figure S2). Results show that, at the student level, SES directly predicted expectancy and value across all four regions, while indirect effect through achievement was found on expectancy and value in all regions, except in Hong Kong. At the school level, school SES directly predicted school expectancy only in Mainland China and Hong Kong, and school value only in Mainland China. School SES indirectly predicted school expectancy through school achievement in all regions, except Mainland China, whereas an indirect effect on school value was found in all four regions.

Discussion

The study intended to find out the interplay among economic resources (family and school SES), motivation (expectancy and value), and reading achievement. We hypothesized that SES at the individual level and school level would predict achievement via greater expectancy and value. The model was tested in samples from Mainland China, Hong Kong, Macau, and Taipei. Results of the multi-group multilevel path modelling revealed that, at the student level, SES positively predicted reading achievement through both expectancy and value in all four regions. In other words, students from more economically advantaged families experience a higher sense of self-efficacy and enjoy reading more, which accounted for their higher levels of reading achievement. However,

although school SES directly predicted school reading achievement in all four groups, motivation at the school level did not mediate this relationship, except for Mainland China. This could be due to motivation being an individual belief or driving force. Hence, it makes sense that it is more predictive at the individual rather than the school level.

Student-level findings

Among students, expectancy and value were found to be consistent mediators of the positive relationship between SES and reading achievement (full mediation was found in Hong Kong and Macau, while partial mediation was found in Mainland China and Chinese Taipei). This means that students who belong to families with greater wealth and possessions, parents with higher educational levels, and more access to educational resources at home tend to be more motivated. Specifically, they have higher expectations of success in performing reading tasks, such as understanding difficult texts and reading fluently, as reflected by their reading self-efficacy. They also tend to find more intrinsic value in reading as they enjoy engaging in reading activities. The increased success expectancy and value of reading, in turn, make the students more likely to have higher reading achievement. Hence, these findings demonstrate how differences in students' motivation and subsequent achievement could be a consequence of differences in family resources.

This is consistent with the contentions of the expectancy-value theory that students' success expectations and intrinsic value for a task could determine student achievement (Eccles et al., 1983; Wigfield & Eccles, 2000), and that these expectancies and values are influenced by family characteristics and resources (Eccles, 2007). There are several ways that family SES could influence students' motivation and achievement through parents' beliefs and practices, as well as the opportunity structures afforded to the children. For instance, parents with higher educational levels and income tend to place higher expectations on their children's educational success. They are also more involved in their children's education and more likely to provide their children with learning materials that stimulate and support intellectual development (Eccles, 2007). Thus, parents from higher SES families may express more confidence in their children's reading abilities. They may also be more involved and supportive in honing their children's reading skills, for instance, by helping them understand difficult texts, asking them how they are doing in their reading subjects, and providing them with resources such as books. Indeed, parental expectancy and involvement are associated with student self-efficacy and performance (Luo, Ng, Lee, & Aye, 2016). In this way, students from higher SES families tend to develop higher expectancy and ultimately perform better at reading.

Although parents' expectancy, value, and other parental beliefs and behaviours that are deemed to facilitate students' reading achievement were not directly measured in the study, the literature shows that these are associated with family SES (e.g., Eccles, 2007). Hence, this provides a theoretically sound explanation for the findings of the study. However, future studies are suggested to empirically examine models including these variables that could potentially mediate the path from SES to motivation and influence students' greater reading achievement.

School-level findings

At the school level, SES remained to be a significant positive predictor of reading achievement, which is in line with existing work (Xuan et al., 2019). However, the

relationship between school SES and school reading achievement was mostly direct, rather than mediated by motivation. This was true for Hong Kong, Macau, and Taipei. The finding that school SES was not mediated by school-level expectancy and value seems somewhat expected given that motivation is usually conceptualized as an individual difference variable.

Perhaps, other school-level variables might be more pertinent mediators of school SES and school reading achievement, such as academic emphasis, collective teacher efficacy, and teacher trust in students and their parents (Arar, 2017). Moreover, increased work demands on staff, lack of prior history of success, and schools' inability to diagnose their needs are some of the characteristics of low SES schools that affect school achievement (Ross, Scott, & Sibbald, 2012). It is suggested that future research explore these possible mediators of school SES and school reading achievement. Nevertheless, the findings provide support to the important role of ecological settings in schools in students' reading development.

An interesting and notable finding in the present study is that, while both value and expectancy at the student levels were both significant mediators of the relation of SES and reading achievement, school-level motivation only mediated the relation of SES and reading achievement in Mainland China but not in other regions. Our results showed that value was a positive mediator while expectancy was a negative mediator. Path coefficients showed that schools with higher SES students in China, as expected, tended to have higher expectancy and value of reading. However, higher school-level expectancy is associated with lower reading achievement. This may be due to the school level expectancy leading to a stressful school climate which may negatively influence reading achievement. Mainland Chinese students are reported to have a very strong commitment to achievement (Yang et al., 2013), and this may create academic pressure when there is a high expectancy of success at the school level (Ning, Van Damme, Gielen, Vanlaar, & Van den Noortgate, 2016). Mainland schools are also notable for fostering high-achievement climates, and there is also a very tough competition to get into university through the gaokao (or college entrance exam). Hence, high levels of expectancy, which might be perceived as stressful by students, could be associated with lower levels of achievement.

As for the regional differences in terms of the mediating role of motivation in SES-achievement relation, it is possible that factors other than motivation may mediate the effects of SES and reading achievement in Hong Kong, Macau, and Taiwan. These alternative factors may include subtle differences in educational systems and teaching/learning approaches that were not captured by the variables included in this study and may need to be more thoroughly explored in future studies.

Across four regions, and in both school and student levels, expectancy and value are strongly associated, albeit being conceptually distinct aspects of motivation. This provides support to the expectancy-value theory (Eccles et al., 1983; Wigfield & Eccles, 2000), as well as the relevance of both aspects of motivation to student achievement. Furthermore, the study provided support to the complementary effects of the two aspects of motivation that link SES and student achievement, and that each is important even while controlling for the other.

Implications and recommendations

Taken together, the findings in both student and school levels indicate that, although economic resources were a crucial factor as regards the disparities in reading achievement, the mechanisms that could explain their relationship seems to differ at

the student and school levels. The role of motivation seems to be more important at the individual level, whereas there could be other processes involved in the relationship between SES and reading achievement at the school level. For instance, low SES schools' lack of resources, having so many non-academic demands that consume staff time, having no prior history of success, and lack of ability to diagnose their needs may contribute to their students' underachievement (Ross et al., 2012). It is suggested that future studies explore these possible mediators of school SES and school reading achievement.

Relations between reading motivation and reading achievement are reciprocal (Schiefele, Stutz, & Schaffner, 2016). In the present study, although we focused on the influence of reading motivation on reading achievement using a theoretical lens, our supplementary analyses did show possible alternative pathways. For example, limited positive experience or continued failure in reading (i.e., low in reading achievement) can lead to less intrinsic motivation (Hebbecke, Forster, & Souvignier, 2019). The interplay of the constructs needs further investigations through studies that use a longitudinal approach.

The study has the policy and practical implications. Given the direct effect of school-level SES on school reading achievement, among the measures that can be taken to assist schools in low SES communities in improving their students' reading achievement is by investing more in these schools and offering financial support and scholarships to students from low SES families (Chen et al., 2018). As regards the indirect effect of SES on reading achievement through motivation, students from low SES families might particularly benefit from interventions based on the expectancy-value framework that intends to help students recognize their capabilities for success and increase their intrinsic value for reading (e.g., Lazowski & Hulleman, 2016; Marinak, 2013).

While students from low SES backgrounds may not necessarily have the advantage of having parents with high expectations for their success, learning resources at home, or parents who model enjoyment for reading, these can be compensated in school. For instance, students' motivation to read can be honed by teachers supporting and expressing their belief in their students' potential to succeed, helping students access reading materials in school, and presenting reading as a fun and enjoyable activity. It is suggested that students' motivation be supported in school earlier in their development to provide disadvantaged students with an opportunity to catch up with their classmates. The provision of financial/social support to lower SES families, which could theoretically serve to increase cultural capital and resources associated with increased motivation, can also be considered.

The study could also have theoretical contributions for understanding the relationship between reading motivation and reading outcomes by integrating the role of SES. Previous studies mostly focused on economic factors and individual differences as separate contributors to learners' reading achievement. This study was able to demonstrate the interplay between the two perspectives (e.g., Du & King, 2022; King & Trinidad, 2021). Moreover, it was able to delineate how these factors influence reading achievement at the individual and school levels. This information could be used to come up with more precise interventions targeting individual learners or policies addressing school problems.

We acknowledge the complexity of the issue of economic inequality, and that there is no fast and simple way to address its effects on student outcomes. However, focusing on the more malleable aspects of its consequences, such as disparities in motivation, can somehow buffer its effects on student achievement.

Future research directions

The study provided a variable-centred examination of students' SES, motivation, and reading achievement, though it would also be interesting to conduct person-centred analyses to explore and compare the profiles of learners from lower SES backgrounds and those with higher SES backgrounds and their motivations and reading achievement. For instance, there may be learners who would be characterized with low SES background but with high motivation and reading abilities. Furthermore, future studies could use other approaches for measuring motivation (e.g., the use of observational methods or experiments) and involve other reader populations (e.g., experienced readers).

Limitations and conclusion

There are some limitations in the study that need to be considered. First, due to its cross-sectional nature, it is not possible to claim cause-and-effect, as well as temporal, relationships among the variables. Second, the study includes only samples from regions in Greater China, and hence, some aspects of its findings might be specific to this culture, and may not be generalizable to samples from other cultures. Nevertheless, this can also be seen as a strength since a large majority of studies in motivation are represented by samples from Western cultures. Third, the expectancy-value research attributes most of the SES effects on parental expectations, beliefs, and behaviours (Eccles, 2007). However, we were not able to account for these in the models tested in the present study. Future studies may examine models including parental variables as potentially different paths influencing greater reading achievement. Fourth, the measurement of the study variables was limited to the items included in PISA. While evidence of reliability and validity were presented, given the limited items of the scales, it is possible that these may not cover the entirety of the constructs. Finally, the supplementary analyses suggest that there are other viable pathways through which SES can affect motivation and reading achievement which are beyond the scope of this study and can further be investigated in future research.

Notwithstanding these limitations, the study was able to demonstrate the motivational gap as a pathway in which economic inequality can contribute to students' reading achievement gap, and hence, provide support for the possible use of motivational interventions to help buffer the negative effects of economic inequality on students' reading achievement.

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Author contributions

Ma Jenina N. Nalipay (Writing – original draft; Writing – review & editing) **Yuyang Cai** (Conceptualization; Funding acquisition; Methodology; Resources; Software; Writing – original draft) **Susanna S. S. Yeung** (Conceptualization; Supervision; Writing – original draft; Writing – review & editing) **Ronnel B. King** (Conceptualization; Methodology; Supervision; Writing – review & editing).

Conflicts of interest

All authors declare no conflict of interest.

Data availability statement

The data that support the findings of this study are openly available in <https://www.oecd.org/pisa/data/2018database/>

REFERENCES

- Alivernini, F., & Lucidi, F. (2011). Relationship between social context, self-efficacy, motivation, academic achievement, and intention to drop out of high school: A longitudinal study. *The Journal of Educational Research*, *104*, 241–252. <https://doi.org/10.1080/00220671003728062>
- Alvermann, D. E. (2002). Effective literacy instruction for adolescents. *Journal of Literacy Research*, *34*, 189–208. https://doi.org/10.1207/s15548430jlr3402_4
- Arar, K. (2017). Leading research in educational administration: A festschrift for Wayne K. Hoy. *International Journal of Educational Management*, *31*, 1147–1149. <https://doi.org/10.1108/IJEM-06-2013-0089>
- Armor, D. J., Marks, G. N., & Malatinszky, A. (2018). The impact of school SES on student achievement: Evidence from U.S. statewide achievement data. *Educational Evaluation and Policy Analysis*, *40*, 613–630. <https://doi.org/10.3102/0162373718787917>
- Barcikowski, R. S. (1981). Statistical power with group means as the unit of analysis. *Journal of Educational Statistics*, *6*, 267–285. <https://doi.org/10.3102/10769986006003267>
- Cantrell, S. C., Rintamaa, M., Anderman, E. M., & Anderman, L. H. (2018). Rural adolescents' reading motivation, achievement and behavior across transition to high school. *The Journal of Educational Research*, *111*, 417–428. <https://doi.org/10.1080/00220671.2017.1284737>
- Chen, Q., Kong, Y., Gao, W., & Mo, L. (2018). Effects of socioeconomic status, parent-child relationship, and learning motivation on reading ability. *Frontiers in Psychology*, *9*, <https://doi.org/10.3389/fpsyg.2018.01297>
- Chiu, M. M., & McBride-Chang, C. (2006). Gender, context, and reading: A comparison of students in 43 countries. *Scientific Studies of Reading*, *10*, 331–362. https://doi.org/10.1207/s1532799xssr1004_1
- Du, H., & King, R. B. (2022). The psychology of economic inequality and social class. *Asian Journal of Social Psychology*, *25*(1), 3–6. <https://doi.org/10.1111/ajsp.12519>
- Durik, A. M., Vida, M., & Eccles, J. S. (2006). Task values and ability beliefs as predictors of high school literacy choices: A developmental analysis. *Journal of Educational Psychology*, *98*, 382–393. <https://doi.org/10.1037/0022-0663.98.2.382>
- Eccles, J. S. (2007). Families, schools, and developing achievement-related motivations and engagement. In J. E. Grusec & P. D. Hastings (Eds.), *Handbook of socialization: Theory and research* (pp. 665–691). New York, NY: The Guilford Press.
- Eccles, J., Adler, T. F., Futterman, R., Goff, S. B., Kaczala, C. M., Meece, J. L., . . . Midgley, C. (1983). Expectancies, values, and academic behaviours. In J. T. Spence (Ed.), *Achievement and achievement motivation* (pp. 75–146). San Francisco: W. H. Freeman.
- Erbeli, F., Bergen, E., & Hart, S. A. (2020). Unraveling the relation between reading comprehension and print exposure. *Child Development*, *91*, 1548–1562. <https://doi.org/10.1111/cdev.13339>
- Guo, X., Lv, B., Zhou, H., Liu, C., Liu, J., Jiang, K., & Luo, L. (2018). Gender differences in how family income and parental education relate to reading achievement in China: The mediating role of parental expectation and parental involvement. *Frontiers in Psychology*, *9*, 783. <https://doi.org/10.3389/fpsyg.2018.00783>

- Guthrie, J. T., Klauda, S. L., & Ho, A. N. (2013). Modeling the relationships among reading instruction, motivation, engagement, and achievement for adolescents. *Reading Research Quarterly*, 48(1), 9–26. <https://doi.org/10.1002/rrq.035>
- Guthrie, J. T., & Wigfield, A. (2000). Engagement and motivation in reading. In M. L. Kamil, P. B. Mosenthal, P. D. Pearson & R. Barr (Eds.), *Handbook of reading research*, Vol. 3 (pp. 403–422). Mahwah, NJ: Lawrence Erlbaum Associates Publishers.
- Hebbecke, K., Förster, N., & Souvignier, E. (2019). Reciprocal effects between reading achievement and intrinsic and extrinsic reading motivation. *Scientific Studies of Reading*, 23(5), 419–436. <https://doi.org/10.1080/10888438.2019.1598413>
- Heck, R. H., & Thomas, S. L. (2015). *An introduction to multilevel modeling techniques: MLM and SEM approaches using Mplus*. New York, NY: Routledge.
- Hoff, E. (2013). Interpreting the early language trajectories of children from low-SES and language minority homes: Implications for closing achievement gaps. *Developmental Psychology*, 49(1), 4–14. <https://doi.org/10.1037/a0027238>
- King, R. B., & Trinidad, J. E. (2021). Growth mindset predicts achievement only among rich students: Examining the interplay between mindset and socioeconomic status. *Social Psychology of Education*. <https://doi.org/10.1007/s11218-021-09616-z>
- Kraus, M. W., Piff, P. K., Mendoza-Denton, R., Rheinschmidt, M. L., & Keltner, D. (2012). Social class, solipsism, and contextualism: How the rich are different from the poor. *Psychological Review*, 119, 546–572. <https://doi.org/10.1037/a0028756>
- Lawson, G. M., & Farah, M. J. (2017). Executive function as a mediator between SES and academic achievement throughout childhood. *International Journal of Behavioral Development*, 41(1), 94–104. <https://doi.org/10.1177/0165025415603489>
- Lazowski, R. A., & Hulleman, C. S. (2016). Motivation interventions in education: A meta-analytic review. *Review of Educational Research*, 86, 602–640. <https://doi.org/10.3102/0034654315617832>
- León, J., Álvarez-Álvarez, C., & Martínez-Abad, F. (2020). Contextual effect of school SES on reading performance: A comparison between countries in the European Union. *Compare: A Journal of Comparative and International Education*, 1–15. <https://doi.org/10.1080/03057925.2020.1840964>
- Luo, W., Ng, P. T., Lee, K., & Aye, K. M. (2016). Self-efficacy, value, and achievement emotions as mediators between parenting practice and homework behavior: A control-value theory perspective. *Learning and Individual Differences*, 50, 275–282. <https://doi.org/10.1016/j.lindif.2016.07.017>
- Mandeville, G. K. (1988). School effectiveness indices revisited: Cross-year stability. *Journal of Educational Measurement*, 25, 349–356. <https://doi.org/10.1111/j.1745-3984.1988.tb00313.x>
- Marinak, B. A. (2013). Courageous Reading Instruction: The effects of an elementary motivation intervention. *The Journal of Educational Research*, 106(1), 39–48. <https://doi.org/10.1080/00220671.2012.658455>
- Martin, A. J., & Lazendic, G. (2018). Achievement in large-scale national numeracy assessment: An ecological study of motivation and student, home, and school predictors. *Journal of Educational Psychology*, 110, 465–482. <https://doi.org/10.1037/edu0000231>
- Maxwell, S., Reynolds, K. J., Lee, E., Subasic, E., & Bromhead, D. (2017). The impact of school climate and school identification on academic achievement: Multilevel modeling with student and teacher data. *Frontiers in Psychology*, 8, 2069. <https://doi.org/10.3389/fpsyg.2017.02069>
- McConney, A., & Perry, L. B. (2010). Science and mathematics achievement in Australia: The role of school socioeconomic composition in educational equity and effectiveness. *International Journal of Science and Mathematics Education*, 8, 429–452. <https://doi.org/10.1007/s10763-010-9197-4>
- Meece, J. L., Glienke, B. B., & Burg, S. (2006). Gender and motivation. *Journal of School Psychology*, 44, 351–373. <https://doi.org/10.1016/j.jsp.2006.04.004>

- Mueller, R. O., & Hancock, G. R. (2010). Structural equation modeling. In G. R. Hancock & R. O. Mueller (Eds.), *The reviewer's guide to quantitative methods in social sciences* (pp. 383). New York, NY: Routledge.
- Muthén, L. K., & Muthén, B. O. (2018). *Mplus Version 8.2*. Los Angeles: Author.
- Nalipay, M. J. N., Cai, Y., & King, R. B. (2020). Why do girls do better in reading than boys? How parental emotional contagion explains gender differences in reading achievement. *Psychology in the Schools, 57*, 310–319. <https://doi.org/10.1002/pits.22330>
- Niederkofer, B., Herrmann, C., Seiler, S., & Gerlach, E. (2015). What influences motivation in physical education? A multilevel approach for identifying climate determinants of achievement motivation. *Psychological Test and Assessment Modeling, 57*(1), 70–93.
- Ning, B., Van Damme, J., Gielen, S., Vanlaar, G., & Van den Noortgate, W. (2016). What makes the difference in reading achievement? Comparisons between Finland and Shanghai. *Scandinavian Journal of Educational Research, 60*, 515–537. <https://doi.org/10.1080/00313831.2015.1062413>
- Noble, K. G., Farah, M. J., & McCandliss, B. D. (2006). Socioeconomic background modulates cognition–achievement relationships in reading. *Cognitive Development, 21*, 349–368. <https://doi.org/10.1016/j.cogdev.2006.01.007>
- OECD (2019a). *Database: PISA 2018*. <https://www.OECD.org/pisa/data/2018database/>
- OECD (2019b). *PISA 2018 Assessment and analytical framework*. Paris: OECD Publishing.
- Park, S., Stone, S. I., & Holloway, S. D. (2017). School-based parental involvement as a predictor of achievement and school learning environment: An elementary school-level analysis. *Children and Youth Services Review, 82*, 195–206. <https://doi.org/10.1016/j.childyouth.2017.09.012>
- Rampey, B. D., Dion, G. S., & Donahue, P. L. (2009). *NAEP 2008: Trends in academic progress*. NCES, 2009–2479.
- Ransdell, S. (2012). There's still no free lunch: Poverty as a composite of SES predicts school-level reading comprehension. *American Behavioral Scientist, 56*, 908–925. <https://doi.org/10.1177/0002764211408878>
- Ross, J. A., Scott, G., & Sibbald, T. M. (2012). Student achievement outcomes comprehensive school reform: A Canadian case study. *The Journal of Educational Research, 105*, 123–133. <https://doi.org/10.1080/00220671.2010.532835>
- Satorra, A., & Bentler, P. M. (1994). Corrections to test statistics and standard errors in covariance structure analysis. In A. von Eye & C. C. Clogg (Eds.), *Latent variables analysis: Applications for developmental research* (pp. 399–419). Thousand Oaks, CA: Sage.
- Schiefele, U., Schaffner, E., Möller, J., Wigfield, A., Nolen, S., & Baker, L. (2012). Dimensions of reading motivation and their relation to reading behavior and competence. *In Reading Research Quarterly, 47*(4), 427–463. <https://doi.org/10.1002/RRQ.030>
- Schiefele, U., Stutz, F., & Schaffner, E. (2016). Longitudinal relations between reading motivation and reading comprehension in the early elementary grades. *Learning and Individual Differences, 51*, 49–58. <https://doi.org/10.1016/j.lindif.2016.08.031>
- Shin, H. W., & So, Y. (2018). The moderating role of socioeconomic status on the motivation of adolescents' foreign language learning strategy use. *System, 73*, 71–79. <https://doi.org/10.1016/j.system.2017.11.007>
- Steinmayr, R., Dinger, F. C., & Spinath, B. (2012). Motivation as a mediator of social disparities in academic achievement. *European Journal of Personality, 26*, 335–349. <https://doi.org/10.1002/per.842>
- Su, M., Peyre, H., Song, S., McBride, C., Tardif, T., Li, H., . . . Shu, H. (2017). The influence of early linguistic skills and family factors on literacy acquisition in Chinese children: Follow-up from age 3 to age 11. *Learning and Instruction, 49*, 54–63. <https://doi.org/10.1016/j.learninstruc.2016.12.003>
- Theroux, K. (2010). *Advancing adolescent literacy: The cornerstone of school reform*. Carnegie Corporation of New York. Retrieved from <http://carnegie.org/publications/search-publications/pub/365/>

- Troyer, M., Kim, J. S., Hale, E., Wantchekon, K. A., & Armstrong, C. (2019). Relations among intrinsic and extrinsic reading motivation, reading amount, and comprehension: A conceptual replication. *Reading and Writing, 32*, 1197–1218. <https://doi.org/10.1007/s11145-018-9907-9>
- Tucker-Drob, E. M., & Harden, K. P. (2012). Learning motivation mediates gene-by-socioeconomic status interaction on mathematics achievement in early childhood. *Learning and Individual Differences, 22*(1), 37–45. <https://doi.org/10.1016/j.lindif.2011.11.015>
- Wang, L., & Finch, H. (2018). Motivation variables mediate the relationship between socioeconomic status and academic achievement. *Psychology and Education, 55*, 1–14.
- Wang, M.-T., Degol, J., & Ye, F. (2015). Math achievement is important, but task values are critical, too: examining the intellectual and motivational factors leading to gender disparities in STEM careers. *Frontiers in Psychology, 6*, 36. <https://doi.org/10.3389/fpsyg.2015.00036>
- Wigfield, A., & Cambria, J. (2010). Expectancy-value theory: Retrospective and prospective. In *Advances in motivation and achievement* (pp. 35–70). [https://doi.org/10.1108/S0749-7423\(2010\)000016A005](https://doi.org/10.1108/S0749-7423(2010)000016A005)
- Wigfield, A., & Eccles, J. S. (2000). Expectancy–value theory of achievement motivation. *Contemporary Educational Psychology, 25*(1), 68–81. <https://doi.org/10.1006/ceps.1999.1015>
- Wigfield, A., Tonks, S. M., & Klauda, S. L. (2016). Expectancy-value theory. In K. R. Wentzel & D. B. Miele (Eds.), *Handbook of motivation at school* (pp. 55–74). New York, NY: Routledge.
- Wolters, C. A., Denton, C. A., York, M. J., & Francis, D. J. (2014). Adolescents' motivation for reading: Group differences and relation to standardized achievement. *Reading and Writing, 27*, 503–533. <https://doi.org/10.1007/s11145-013-9454-3>
- Xuan, X., Xue, Y., Zhang, C., Luo, Y., Jiang, W., Qi, M., & Wang, Y. (2019). Relationship among school socioeconomic status, teacher-student relationship, and middle school students' academic achievement in China: Using the multilevel mediation model. *PLoS One, 14*(3), e0213783.
- Yang, C., Bear, G. G., Chen, F. F., Zhang, W., Blank, J. C., & Huang, X. (2013). Students' perceptions of school climate in the U.S. and China. *School Psychology Quarterly, 28*, 7–24.
- Yang Hansen, K., Rosén, M., & Gustafsson, J. (2011). Changes in the multi-level effects of socioeconomic status on reading achievement in Sweden in 1991 and 2001. *Scandinavian Journal of Educational Research, 55*, 197–211. <https://doi.org/10.1080/00313831.2011.554700>
- Zhang, L., & Seepho, S. (2013). Metacognitive strategy use and academic reading achievement: Insights from a Chinese context. *Electronic Journal of Foreign Language Teaching, 10*(1), 54–69.

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Supporting Information

The following supporting information may be found in the online edition of the article:

Figure S1. Two-level path model of SES predicting motivation through reading achievement.

Table S1. S1.1 Descriptive statistics by regions; S1.2 Multiple Comparisons (LSD).

Table S2. Measurement invariance assessment across groups.

Table S3. Correlations by SES level for Mainland China.

Table S4. Correlations by SES level for Hong Kong.

Table S5. Correlations by SES level for Macau.

Table S6. Correlations by SES Level for Taipei

Table S7. Correlations by reading ability level for Mainland China.

Table S8. Correlations by reading ability level for Hong Kong.

Table S9. Correlations by reading ability level for Macau.

Table S10. Correlations by reading ability level for Taipei.

Table S11. Effect sizes of SES and motivation variables across the four regions.