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Why do girls do better in reading than boys? How parental emotional contagion explains gender differences in reading achievement

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Abstract

Previous studies that attempted to explain why girls often perform better than boys in reading have emphasized the role of values and beliefs, with little attention paid to the role of emotions. This study focused on the role of parent-child emotional contagion in explaining gender differences, by investigating how parents' reading emotion predicts students' reading emotion and subsequent reading achievement. The data that was used was from a subsample of students from the Program for International Students Assessment ($n = 84,429$) from 14 countries. Multi-group structural equation modeling was conducted to assess a model of parents' enjoyment of reading predicting reading achievement through students' enjoyment of reading. Results provided support for a model of parents' enjoyment of reading, predicting students' enjoyment of reading, and subsequent reading achievement for both girls and boys. However, the indirect effect of parents' enjoyment of reading on reading achievement through students' enjoyment of reading was found to be stronger in girls than in boys. Findings emphasize the important role of parents' emotions on student outcomes and how gender biases in a certain context can affect the extent to which parents' emotions can influence student achievement.

KEYWORDS

emotional contagion, gender differences, reading achievement, reading emotions

1 | INTRODUCTION

Gender differences in reading favoring girls have been consistently reported. International test results have shown that girls outperform boys in terms of reading achievement. A large-scale meta-analysis by Voyer and Voyer (2014) included data from 369 samples and more than one million students have found that girls outperformed boys in language courses, including reading. Among adolescents from 43 countries, girls scored higher than boys in reading achievement in every country (Chiu & McBride-Chang, 2006; see also Mullis, Martin, Kennedy, & Foy, 2007). Logan and Johnston (2010) noted that these findings are consistent even when the type of reading instruction received by the participants or the system of writing are considered.

Aside from having better reading performance, girls were also found to read more frequently than boys (Coles & Hall, 2002; Logan & Johnston, 2009). Moreover, girls have a more positive attitude towards reading (Logan & Johnston, 2009; Sainsbury & Schagen, 2004). They also find reading more enjoyable than boys (Sainsbury & Schagen, 2004).

Most of the existing studies that attempt to explain the gender gap in achievement focused on socialization processes, particularly on how parents influence their children's beliefs and values (e.g., expectancy-value or self-concept beliefs (Durik, Vida, & Eccles, 2006; Marinak & Gambrell, 2010). For example, studies have found that parents' beliefs in the usefulness of science strongly influenced boys but not girls (Lee, Shin, & Bong, 2019).

Aside from influencing beliefs and values, however, parents can also exert a strong impact on the emotions that their children feel (e.g., Else-Quest, Hyde, & Hejmadi, 2008; Moè & Katz, 2018). In this study, it is proposed that gender differences in reading achievement might be partly explained by parental influences on their children's emotions (which is called emotional contagion for shorthand), particularly reading enjoyment.

Therefore, the aim of this study was to examine whether gender differences in reading achievement can be accounted for by parents' enjoyment of reading and the emotional contagion of reading enjoyment from parents to their children. To achieve this aim, secondary data from the Program for International Student Assessment (PISA) drawing on 84,429 students in 14 countries were analyzed.

This study contributes to the literature in several important ways: first, the bulk of the existing studies on gender differences in achievement have focused on the parental transmission of beliefs and values but have given relatively short shrift to the role of emotional contagion, which pertains to how parents influence their children's emotions. Despite growing awareness that emotions are crucial to learning and achievement (Pekrun, 2006; Pekrun, Goetz, Titz, & Perry, 2002), the role of emotions in educational research is still relatively under-explored as the bulk of the research has been on cognitive factors.

Second, methodologically, most of the existing studies have relied on small sample sizes and are usually confined to one cultural context (e.g., Lee et al., 2019; Logan & Johnston, 2009). This limits the generalizability of these studies. Through the use of PISA, this study was able to include nationally representative data from 14 countries. This allowed the maximization of sample size and greater cross-cultural generalizability.

Third, many studies on parental influences have used self-report measures of student perceptions. Self-report measures that all come from one source (i.e., students) might be biased by common method variance and lead to biased parameter estimates (Podsakoff, MacKenzie, Lee, & Podsakoff, 2003). PISA has data obtained from parents themselves and these data are linked to student self-report data as well as objective measures of student achievement. The robustness of the data allows more confidence in the results obtained.

2 | THE ROLE OF EMOTIONS IN LEARNING AND ACHIEVEMENT

The emotions students experience towards academic activities and outcomes play a crucial role in their learning and achievement. Emotions affect the cognitive, motivational, and regulatory processes that mediate student

learning and achievement. Furthermore, academic emotions were found to be associated with learning strategies and their academic performance (Pekrun, 2006; Pekrun et al., 2002).

Positive emotions, such as enjoyment of learning, focus students' attention on the tasks at hand and strengthen student motivation, thereby resulting in better performance (Pekrun, 2006). Moreover, students with positive emotions were found to use more flexible and creative learning strategies, in contrast to more rigid strategies used by students with negative emotions (Isen, 2000). Since positive emotions are associated with cognitive flexibility, which is important for adaptive learning to goals and task demands, it can also facilitate students' self-regulation of learning (Wolters, 2003). Considering that positive emotions facilitate processes that lead to better student performance (Pekrun, 2006; Pekrun et al., 2002), it is proposed that enjoyment of reading would be associated with higher reading achievement.

3 | PARENT'S INFLUENCE ON STUDENT'S EMOTIONS AND ACHIEVEMENT

The role of parents in shaping student outcomes has been underscored in the literature. A meta-analysis by Castro et al. (2015) demonstrated the positive impact of parent involvement on student achievement, especially when parents have high expectations for their children, communicate with them regularly regarding school activities, and assist them in developing study habits. In some studies, though, parents seem to influence their children less deliberately. In a study by Chi et al. (2019), well-being contagion was revealed as parents' well-being was "caught" by their children.

Aside from well-being, past studies have found evidence for emotional contagion or the process by which one person's emotions trigger similar emotions in another person (Hatfield, Cacioppo, & Rapson, 1994; King & Datu, 2017). Moè and Katz (2018) found that parents' emotions predict students' emotions towards their homework. Parents' positive emotions were strongly associated with their involvement in their children's homework, thereby increasing students' positive emotions and self-efficacy regarding doing their homework. A number of other studies had similar findings, wherein parents' and children's positive (e.g., pride, joy, interest) and negative (e.g., frustration, distress, helplessness) emotions towards a task were found to be closely associated (Else-Quest et al., 2008; Katz, Buzukashvili, & Feingold, 2012; Pomerantz, Wang, & Ng, 2005).

Given that parents play a crucial role in the management of their children's emotional demands, and in shaping their children's emotions and emotion-regulation abilities (Meyer, Raikes, Virmani, Waters, & Thompson, 2014; Thompson & Meyer, 2007), emotional contagion between parents and children is highly likely. Indeed, emotional contagion has been found to be strong in parent-child relationships (Butler, 2015). Considering the evidence of emotional contagion between parents and children, and the role of emotions in student achievement, it is proposed that parents' reading emotion, specifically enjoyment of reading, would be associated with students' reading emotion and subsequent reading achievement.

4 | GENDER DIFFERENCES IN EMOTIONAL CONTAGION

Parents play a crucial role in determining student outcomes. However, in some contexts, parental influence appears to be moderated by students' gender. For instance, in the science, technology, engineering, and mathematics (STEM) domains, parents seem to more strongly influence their sons than their daughters. In a study by Lee et al. (2019), it was found that parents' value beliefs in science were highly predictive of their sons' motivation and achievement, but not their daughters'. Further, parents' beliefs about the utility value of science, both for themselves and for their children, predicted boys' STEM career aspirations as well as a scientific achievement. This gender discrepancy in parental influence in STEM domains can be explained by expectancy-value theory (Eccles et al., 1983).

Expectancy-value theory posits that students' educational choices are motivated by their expectations of success and subjective task value (beliefs), which includes their interest in doing the task (i.e., intrinsic value); perception of importance of being good at the task (i.e., attainment value); usefulness of the task (i.e., utility value); and how it competes with other goals (i.e., cost). Students' perceptions of expectancy and value are developed through socialization with significant others and external environments (Eccles et al., 1983). The role of parents as critical socializers in shaping a child's identity and motivation (Wigfield & Eccles, 1992) makes it likely for them to transmit their own beliefs about the utility value of a certain field to their children as well as their gender biases. This assumption is corroborated in Lee's et al. (2019) study, wherein parental influence was found to be stronger in boys than in girls in the male-dominated field of STEM.

Though mostly applied to beliefs, expectancy-value theory applies to emotions as well. Individuals are motivated to experience emotions they expect would be useful to them and that would be instrumental in achieving their goals (Tamir, Bigman, Rhodes, Salerno, & Schreier, 2015). Given that parents tend to transmit their utility value beliefs about a certain domain to their children, and that the extent to which parents influence their children is affected by gender biases, it is possible that a similar process would apply in terms of the emotional contagion of parents to their children regarding a certain domain. Thus, the contagion of emotions regarded as useful and important for success in a particular field could be stronger between parents and students whose gender is more likely to be associated with that field. Considering that reading has been identified more closely with females (McGeown, 2015; Scheiber, Reynolds, Hajovsky, & Kaufman, 2015; Wigfield et al., 1997), it is proposed that the extent to which parents' enjoyment of reading would predict students' enjoyment of reading and subsequent reading achievement would be stronger in girls than in boys.

5 | THE PRESENT STUDY

The aim of the present study was to examine whether gender differences in reading achievement can be explained by the emotional contagion of reading enjoyment from parents to their children. Two approaches have been suggested in understanding gender differences in student outcomes in a particular area and factors that contribute to it: (a) focusing on gender differences in student outcomes and contributing factors to quantify and describe the degree to which a particular gender dominates the area; and (b) focusing on gender differences in the relationship between student outcomes and factors that contribute to it (Lee et al., 2019). To understand gender differences in reading, in line with the first approach, the difference in reading achievement scores between girls and boys and the invariance of parents' and students' enjoyment of reading across gender were examined. Then, as suggested in the second approach, a model of parents' enjoyment of reading predicting students' enjoyment of reading, which in turn, predicts subsequent reading achievement across gender was investigated. It is hypothesized that this relationship is stronger in girls than in boys.

6 | METHODS

6.1 | Data and measures

The study made use of the organization for economic co-operation and development—Program for International Student Assessment (PISA) Schleicher, Zimmer, Evans, & Clements, (2009) data from 84,429 students from 14 countries: Chile, Croatia, Denmark, Germany, Hong Kong, Hungary, Italy, Korea, Lithuania, Macao, New Zealand, Panama, Portugal, and Qatar; ($n = 43,048$ [51%] girls, $n = 41,381$ [49%] boys), with a mean age of 15.75 (standard deviation = 0.29) years old. Reading achievement was scaled using the Rasch method to have a mean of 500 and a standard deviation of 100 (Organization for Economic Co-Operation & Development OECD, 2012). Parents' and

TABLE 1 Descriptive statistics and reliability for the study variables

			Girls		Boys	
			Mean	SD	Mean	SD
Parents' enjoyment of reading	PA06Q01	Reading is one of my favorite hobbies	3.03	0.79	3.04	0.77
	PA06Q02	I feel happy if I receive a book as a present	3.13	0.77	3.14	0.75
	PA06Q04	I enjoy going to a bookstore or a library	2.93	0.82	2.94	0.81
		Total	3.03	0.79	3.04	0.78
		Cronbach's α	.81		.76	
Students' enjoyment of reading	ST24Q02	Reading is one of my favorite hobbies	2.53	0.92	2.08	0.89
	ST24Q03	I like talking about books with other people	2.54	0.87	2.13	0.88
	ST24Q05	I feel happy if I receive a book as a present	2.65	0.91	2.23	0.92
	ST24Q07	I enjoy going to a bookstore or a library	2.63	0.90	2.11	0.90
	ST24Q10	I like to express my opinions about books I have read	2.89	0.83	2.52	0.92
	ST24Q11	I like to exchange books with my friends	2.64	0.92	2.02	0.91
		Total	2.65	0.89	2.18	0.91
	Cronbach's α	.84		.83		
Reading achievement			504.40	93.40	469.23	98.43

Abbreviation: SD, standard deviation.

students' enjoyment of reading (three and six items, respectively) were measured on a scale of 1 ("strongly disagree") to 4 ("strongly agree"). Table 1 shows the items and reliability for measures of parents' and students' enjoyment of reading.

6.2 | Data analysis

Before the main analysis, missing values were replaced using multiple imputation method (Rubin, 1987; Schafer, 1997). Primary data analysis involved three steps. First, single-group confirmatory factor analyses (CFA) were conducted to assess the measurement validity of parents' and students' enjoyment of reading. Second, multi-group CFA (MG-CFA) was performed to assess the invariance of parents' and students' enjoyment of reading across gender. Lastly, multi-group structural equation modeling (MG-SEM) was conducted to examine the effects of parents' enjoyment of reading on reading achievement through students' enjoyment of reading, with socioeconomic status (SES) as a covariate. CFA and SEM models were analyzed using maximum likelihood robust estimator in Mplus version 8.2 (Muthén & Muthén, 2017).

The following fit indices were used to evaluate the goodness of fit of the models: root mean square error of approximation (RMSEA), standardized root mean square residual (SRMR), Tucker–Lewis index (TLI), and comparative fit index (CFI). RMSEA values <0.08 and <0.05 were considered acceptable and good fit, respectively (Browne & Cudeck, 1992). SRMR values >0.09 were considered reasonable fit (Hu & Bentler, 1999). For TLI and CFI, values >0.90 were considered acceptable fit, while >0.95 were interpreted as good fit (Byrne, 2010). For model comparison, a decrease of 0.01 or less in CFI was considered evidence of invariance (Cheung & Rensvold, 2002).

TABLE 2 Bivariate correlations of the study variables

	Reading achievement	Parents' enjoyment of reading	Students' enjoyment of reading	Socioeconomic status
Reading achievement	–	0.131*	0.275*	0.283*
Parents' enjoyment of Reading	0.115*	–	0.217*	0.308*
Students' enjoyment of Reading	0.198*	0.129*	–	0.143*
Socioeconomic status	0.267*	0.284*	0.097*	–

Note: The upper matrix is for girls, the lower matrix is for boys.

* $p < .01$.

7 | RESULTS

7.1 | Descriptive statistics

Table 1 shows the means and standard deviations of the study variables. Girls' reading achievement were significantly higher than that of boys ($t = 53.232$, $df = 84,427$, $p < .001$). Table 2 presents the bivariate correlations. Parents' enjoyment of reading, students' enjoyment of reading, and reading achievement have all been found to be positively related to each other for both girls and boys.

7.2 | Results of CFA and MG-CFA

To determine the measurement validity and invariance of parents' and students' enjoyment of reading across gender, CFA and MG-CFA were conducted (see Table 3). The measurement models of parents' and students' (after freeing the following covariances: ST24Q02 with ST24Q10, ST24Q02 with ST24Q11, and ST24Q05 with ST24Q07) enjoyment of reading (Models 1a and 2a) both fit the data well.

Configural (Model 1b, no parameter constraints), metric (Model 1c, equal factor loadings), and scalar (Model 1d, equal intercepts) invariance across gender were found in parents' enjoyment of reading. This means that parents of

TABLE 3 Model fit statistics for invariance assessment and structural equation modeling

	χ^2	df	χ^2/df	p Value	RMSEA (95% CI)	SRMR	CFI	TLI	ΔCFI
Parents' enjoyment of reading									
Model 1a: Single-group CFA	0.000	0	–	–	.000 (0.000–0.000)	0.000	1.000	1.000	–
Model 1b: Configural invariance	0.001	0	–	–	.000 (0.000–0.000)	0.000	1.000	1.000	0.000
Model 1c: Metric invariance	1.917	2	0.96	.384	.000 (0.000–0.010)	0.003	1.000	1.000	0.000
Model 1d. Scalar invariance	13.997	5	2.80	.016	.007 (0.003–0.011)	0.006	1.000	1.000	0.000
Students' enjoyment of reading									
Model 2a: Single-group CFA	1259.503	6	209.92	.000	.050 (0.047–0.052)	0.014	0.994	0.984	–
Model 2b: Configural model	1475.365	12	122.95	.000	.054 (0.051–0.056)	0.016	0.991	0.979	0.003
Model 2c: Metric invariance	1629.870	17	95.87	.000	.047 (0.045–0.049)	0.022	0.991	0.983	0.000
Model 2d: Scalar invariance	12849.975	23	558.69	.000	.115 (0.113–0.117)	0.139	0.925	0.903	0.075
Parents' enjoyment of reading on reading achievement through students' enjoyment of reading									
Model 3: The full multi-group structural model	5469.570	89	61.46	.000	.038 (0.037–0.039)	0.023	0.981	0.976	–

Abbreviations: CFA, confirmatory factor analyses; CFI, comparative fit index; CI, confidence interval; RMSEA, root mean square error of approximation; SRMR, standardized root mean square residual; TLI, Tucker–Lewis index.

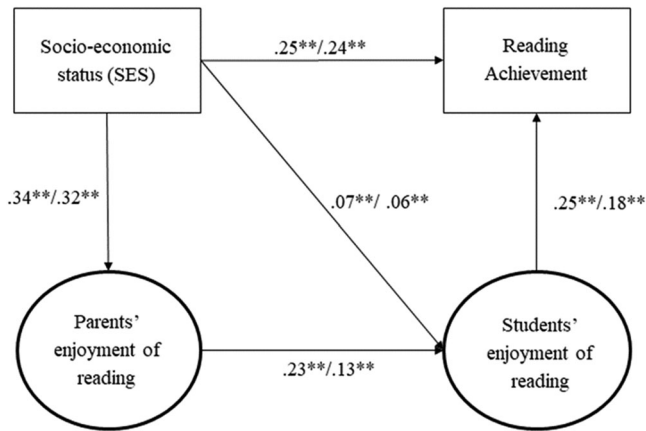


FIGURE 1 MG-SEM results of parents' enjoyment of reading on reading achievement through students' enjoyment of reading controlling for SES. Estimates on the left are for girls, in the right are for boys. All coefficients are standardized. Standardized estimates of path coefficients with values of 0.05, 0.15, and 0.24 and above are interpreted as small, moderate, and large effect, respectively (Hattie, 2009). MG-SEM, multi-group structural equation modeling; SES, socioeconomic status

girls and boys have the same understanding of enjoyment of reading and endorsed its indicators in a similar manner.

On the other hand, students' enjoyment of reading showed configural (Model 2b) and metric (Model 2c) but not scalar (Model 2d) invariance across gender. This indicates that although girls and boys construed reading enjoyment similarly, girls endorsed its indicators more strongly than boys did. The finding that girls enjoy reading more than boys is congruent with the literature on girls being more frequent readers than boys (Coles & Hall, 2002; Logan & Johnston, 2009) and having a more positive attitude towards it (Logan & Johnston, 2009; Sainsbury & Schagen, 2004).

7.3 | Results of MG-SEM

Results of MG-SEM indicated that the model of parents' enjoyment of reading predicting reading achievement through students' enjoyment of reading across gender, controlling for SES, has a good fit to the data (see Table 3; Model 3). Estimates of path coefficients are shown in Figure 1. Wald tests revealed significant differences in the effects of parents' enjoyment of reading on students' enjoyment of reading ($\chi^2 = 119.33$, $df = 1$, $p = .000$); and students' enjoyment of reading on reading achievement ($\chi^2 = 57.87$, $df = 1$, $p = .000$), favoring girls. Moreover, stronger indirect effect of parents' enjoyment of reading on reading achievement through students' enjoyment of reading was found in girls ($\beta = .06$, $p < .01$) than in boys ($\beta = .02$, $p < .01$; $\chi^2 = 175.78$, $df = 1$, $p = .000$), indicating that the effect of emotional contagion on reading achievement is stronger in girls than in boys.

8 | DISCUSSION

The study aims to examine whether emotional contagion from parents to children can explain gender differences in reading achievement. Results showed that, based on reading achievement scores, girls performed significantly better than boys. This is consistent with past studies indicating a female advantage in reading achievement (Chiu & McBride-Chang, 2006; Lynn & Mikk, 2009; Mullis et al., 2007).

The finding that parents' enjoyment of reading significantly predicted students' enjoyment of reading and subsequent reading achievement in both girls and (to a lesser extent) boys is evident of emotional contagion and its effect on student outcomes. This reinforces the important role parents play in student achievement not only through direct involvement or intervention but also through the emotions they convey. As parents show positive emotions towards a task, parents transmit to their children a positive message regarding its value and support the development of behaviors associated with success in this task (Hoover-Dempsey et al., 2001; Moè & Katz, 2018). Indeed, parents' ability to influence students' emotional functioning and achievement through their own motivation and affective dispositions has been demonstrated in past studies (Gonida & Cortina, 2014; Moè & Katz, 2018).

However, there are other factors that determine the extent to which parents can influence students' emotions and achievement, such as gender and its concomitant biases. Whereas boys seem to be more affected by their parents' influence in a male-dominated field like STEM (Lee et al., 2019), the study provided evidence that parents' influence is stronger in girls in an area identified more closely with females like reading (McGeown, 2015; Scheiber et al., 2015; Wigfield et al., 1997).

The stronger emotional contagion and its effect on reading achievement among girls can be understood in light of the expectancies and value placed upon the emotion of interest (i.e., enjoyment of reading) (Tamir et al., 2015). The gender bias in reading puts expectations among girls to do better in this field. Positive emotions, such as enjoyment, which could facilitate and reinforce better performance and success in reading, could be deemed more valuable for girls than for boys. The greater importance and value placed on the enjoyment of reading for girls make this emotion more salient and more likely to be transmitted from parents to their daughters, thus strengthening the emotional contagion, which contributes to higher reading achievement. To our knowledge, this finding is novel as most of the studies have focused on beliefs and values, and our study shows that emotional contagion is another pathway through which parents can exert an influence on their children's achievement.

The study has important implications. Theoretically, it provided support for a model of emotional contagion of reading enjoyment between parents and their children predicting reading achievement. Moreover, it demonstrated the role of parent-child emotional contagion in explaining gender differences in student outcomes and extended past studies in the role of expectancies and value in the gender gap in student achievement to emotions. In terms of practical implications, the findings provided useful information that can help parents become more cognizant of their roles as critical socializers, and how their emotions towards a certain task or field can influence their children's outcomes. This information can also be useful in designing interventions that intend to address the gender gap in student performance in certain fields.

The study has some limitations, including its focus only on the emotion of enjoyment and its cross-sectional nature that prevents causal inferences to be made. Nonetheless, the present study extended the findings of previous studies regarding gender differences in student outcomes by focusing on parent-child emotional contagion in the context of reading. The study also involved a larger, more diverse, and nationally representative sample, which could increase its generalizability. The study findings emphasize the important role of parents' emotions on student outcomes and how gender biases in a certain context can affect the extent to which parents' emotions can influence student achievement.

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