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A Chip Off the Old Block: Do Reading-Motivated Parents Raise Reading-Motivated Children?

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ABSTRACT

The aim of this study was to investigate the relationship between parents' reading motivation and leisure reading frequency and their children's reading motivation. Secondary data analysis was used to examine a sample of almost 330,000 Chilean adolescents. The results of multilevel regression models revealed that parents' reading motivation and frequency were significantly and positively associated with adolescents' reading motivation, even after controlling for their classmates' and their own previous reading achievement. Furthermore, the negative and significant association found between students' reading motivation and their socioeconomic status was smaller in effect size than that of parents' reading motivation and frequency combined. The implications and limitations of these findings are also discussed.

Introduction

Frequent reading is a habit that reaps many benefits for those who practice it. Reading increases readers' knowledge about the world, augments their vocabulary, opens opportunities to better-paid jobs, and is associated with increased levels of empathy, self-esteem, and self-efficacy (Schwanenflugel & Knapp, 2016). Hence, it is not surprising that schools put the development of frequent readers at the core of their curricula. For example, the first learning objective in the Chilean national curriculum for language arts in secondary school is to ensure students "read habitually to learn and to enjoy themselves" (Ministerio de Educación, 2015).

Leisure reading (also known as recreational reading, pleasure reading, voluntary reading, or volitional reading) is defined as voluntary reading aimed at the enjoyment of the act of reading itself, not compelled by external circumstances, duties, or rewards. Leisure reading has been associated with reduced stress (Levine et al., 2022), high vocabulary gains (McQuillan, 2019; Sullivan & Brown, 2015), mathematic achievement (Sullivan & Brown, 2015), and longevity (Bavishi et al., 2016).

Since research suggests that leisure reading is associated with several desirable outcomes, it is worrisome to observe that most Chilean students do not read voluntarily. Indeed, data suggest that Chilean schools are failing to form habitual readers. A nationally representative survey showed that only 13% of Chilean students between 9 and 17 years old considered themselves frequent readers, and that, on average, they read only two books for pleasure per year (Consejo Nacional de la Cultura y las Artes, 2014). The purpose of this study was to examine malleable variables that, according to previous literature and theoretical models, could eventually affect students' leisure reading.

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Leisure Reading and Reading Motivation

Substantial evidence shows that the amount of leisure reading correlates to reading motivation (de Naeghel et al., 2012; Guthrie et al., 1999, 2007; Guthrie & Klauda, 2014; Orellana et al., 2020). Reading motivation refers to the "relatively stable readiness of a person to initiate particular reading activities" (Schiefele et al., 2012, p. 429). More specifically, leisure reading is particularly linked to intrinsic reading motivation, which refers to reading for the rewards of the activity itself, e.g. to know more about a topic or to get lost in a story (Schiefele et al., 2012). On the other hand, those who read to compete with others, to earn recognition or good grades, or to comply with assigned work are said to have extrinsic reading motivation. The focus of this study is students' intrinsic reading motivation since its emphasis on the voluntary aspects of choosing to read is logically connected to leisure reading and because evidence suggests that intrinsic reading motivation correlates more strongly than extrinsic reading motivation to other desirable outcomes, like reading amount and achievement (Logan et al., 2011; Retelsdorf et al., 2011; Schiefele et al., 2012).

Antecedents of Reading Motivation in Theoretical Models

In their exhaustive examination of quantitative and qualitative studies on reading motivation, Schiefele et al. (2012) identified a few factors that influence individuals' decision for reading, what they refer to as "antecedents of reading motivation." Two of those antecedents are readers' sense of their own competence in reading (like their self-concept as readers and their reading self-efficacy) and the value assigned to reading.

These antecedents identified by Schiefele et al. (2012) align with theoretical conceptualizations of motivation. For example, in Ryan and Deci's self-determination theory (Ryan & Deci, 2000), they attempt to explain human behavior by identifying three basic needs that require satisfaction as antecedents of motivation: relatedness, the need to feel connected and accepted by others; competence, the sense of one's ability to succeed in tasks; and autonomy, the perception of volition and freedom in initiating an activity (de Naeghel, Valcke, et al., 2014). The need for competence relates to the concepts of self-concept and self-efficacy, and the need for relatedness relates to the value of reading, specifically in readers' social context.

The Expectancy × Value model for reading motivation (adapted by Schwanenflugel & Knapp, 2016) based on Wigfield, 1994 and Wigfield & Eccles, 2000, also includes readers' sense of competence and the value of reading in their social contexts. In this model, the antecedents of reading motivation are classified into two categories: (1) factors related to readers' expectations of reading successfully and (2) factors related to their value of reading. High expectations of success and high value of reading, thus, results in high motivation to read. One of the factors that the authors describe as affecting readers' expectancy of success, for example, is their self-efficacy as readers (Schwanenflugel & Knapp, 2016, p. 229). Students are more likely to read if they perceive themselves as competent readers. On the other hand, a factor that impacts readers' value of reading is the relational value assigned to reading. Students are more likely to read if reading allows them to strengthen the relationships with peers and adults they care about.

Antecedents of Reading Motivation in Empirical Studies

Considerable evidence supports the importance of students' sense of their own competence and the value of reading in their social contexts as antecedents of students' motivation to read. Researchers have found that students who see themselves as good readers, believe in their capacity to read well, and are surrounded by others who are readers are more likely to develop reading motivation than their peers (Guthrie & Wigfield, 2000). Furthermore, several researchers have showed that programs based on augmenting readers' competence in reading and their interactions with peers and teachers who value reading can boost students' reading motivation (de Naeghel et al., 2012, 2016; de Naeghel, Valcke, et al., 2014; de Naeghel, van Keer, & Vanderlinde, 2014; Guthrie et al., 2004; Guthrie & Klauda, 2014; Guthrie & Wigfield, 2000).

Relationship between Competence Beliefs and Reading Motivation

Self-efficacy and self-concept are two examples of competence beliefs: self-concept refers to individuals' general perception of their competency, while self-efficacy refers to individuals' domain-specific perception of their abilities (Morgan & Fuchs, 2007). Reading motivation models suggest that students who believe they will be successful at reading are likely to be motivated to read. Scholars have found evidence to confirm that a positive and significant association exists between readers' competence beliefs and their reading motivation (Guthrie et al., 1999, 2013).

Furthermore, studies suggest that the relationship between readers' competence beliefs and their reading motivation is reciprocal and influenced by readers' achievement in reading. For example, a few scholars have found that students' reading achievement predicted their subsequent competence beliefs about reading (Hebbecker et al., 2019; Morgan & Fuchs, 2007; Retelsdorf et al., 2014). Such association was significant for students from kindergarten to secondary school. Some scholars went further and found that students' competence beliefs predicted their subsequent reading achievement even when controlling for their previous achievement, suggesting a bidirectional

relationship between reading achievement and competency beliefs about reading (Hebbecker et al., 2019; Retelsdorf et al., 2014). Given that previous reading achievement is strongly associated with reading competence beliefs and that both achievement and beliefs are associated with reading motivation, the inclusion of reading achievement as a covariate in statistical models with reading motivation as a dependent variable such as those explained in this study is likely to account for considerable explained variance.

Relationship between Value of Reading in the Social Context and Reading Motivation

Students' social context include their parents and their peers. According to the previously explained models, students' reading motivation could be affected by how their peers and parents value reading. In turn, parents' value of reading is associated with their frequency of leisure reading, level of reading motivation, socioeconomic status (SES), and academic expectations. The contextual effect of peers' value of reading has not been researched as profoundly as parents', but some evidence suggests that it is likely to affect individual students' reading motivation. The following paragraphs describe significant findings related to both parents' and peers' value of reading, considering how they might affect students' reading motivation.

Parents' Leisure Reading

Research conducted over 20 years did not find significant associations between parents' frequency of leisure reading and their children's (Hall & Coles, 1999; Neuman, 1986; Shapiro & Whitney, 1997). For example, after surveying a sample of over 8000 English students between 10 and 14 years old, Hall and Coles (1999) observed that the average reading frequency of boys who lived with adults they perceived as readers was not different from that of their peers who lived with adults they did not perceive as readers. Likewise, the average number of books that girls read per year did not depend on whether they lived with adults they perceived as readers. Furthermore, Shapiro and Whitney (1997) counted the instances of leisure reading during 3 weeks for a group of 90 fifth graders in the United States and interviewed those whose reading frequency was at least 1.5 standard deviations above the mean. They found that these avid readers were not more likely to perceive their parents as frequent readers than their reluctant-reading peers. Although these findings contradict the theoretical models that point readers' social context as one that influences their decision to read, they should be interpreted with caution as all of them relied on children's reports of their parents' leisure reading habits, which may not be as accurate as other forms of measurement.

However, some more recent evidence suggests that parents' leisure reading is indeed correlated to that of their children's (Arua & Arua, 2011; McKool, 2007). For example, in a study with a socioeconomically diverse sample of nearly 200 fifth graders in the United States, McKool (2007) found that avid readers (top 10 most-frequent readers per school) were more likely to have parents who read for enjoyment than reluctant readers (bottom 10 least-frequent readers per school). Although promising and aligned to theoretical conceptualizations of reading motivation, McKool's and Arua and Arua's findings should be interpreted with caution, as both studies had small samples and relied on students' reports of their parents' leisure reading amount, which might not be as reliable as other more direct measures. This study aims to contribute to explore the relationship between children's reading motivation and their parents' leisure reading with a bigger sample size and a more reliable measure of parents' leisure reading habits.

Parents' Beliefs and Motivation

Other scholars have studied the association between parents' general beliefs around reading and their children's reading motivation. Studies with young children found that parents who endorse reading as a pleasurable activity were likely to have children who showed interest in reading and reported high reading motivation (Baker, 2003; DeBarshye, 1995; Yeo et al., 2014).

Two studies have examined the influence of parents' reading motivation on their adolescent children's reading motivation. Lim et al. (2015) examined the results of the 2009 Program for International Student Assessment (PISA) on reading of a nationally representative sample consisting of nearly 5000 fifteen- and sixteen-year-old Korean students. They found that parents' attitude toward reading positively predicted students' positive reading attitude, and negatively predicted students' negative reading attitude. That is, as parents' positive attitude toward reading increased, their children's positive attitude tended to increase, and their negative attitude tended to decrease.

With the same objective as Lim et al. (2015), researchers from the Chilean Agency of Educational Quality (CAEQ) developed a multilevel model to examine how demographic variables, SES factors, literacy-related habits, teacher practices, and school characteristics contributed to predicting Chilean tenth graders' reading motivation (Agencia de Calidad de la Educación, 2016). Using the 2015 national reading assessment data set (SIMCE; System of Measurement of Educational Quality, acronym in Spanish) they found that, while controlling for other variables, parents' self-reported reading motivation level was a significant predictor of students' reading motivation. Specifically, they observed that a one-unit increase in parents' reading motivation resulted in an increase of 0.15 points in students' reading motivation.

Unfortunately, both Lim et al.'s (2015) study and the CAEQ report suffered from methodological issues that

call into question their results. Lim et al. (2015) acknowledged a collinearity issue to explain why they found that parents' reading frequency negatively correlated with students' positive reading attitude, and the CAEQ report lacked a thorough explanation of their methods that would allow for a replication of their study. Thus, research with more robust methods could shed light on the still uncertain relationship between parents' reading motivation and their children's.

Parents' Socioeconomic Status

Scholars have found that parents' reading-related habits are positively correlated with their SES (DeBarshye, 1995; McKool, 2007; Neuman, 1986). The demands of poverty, its associated stress, and other life constraints (Berliner, 2006) might decrease the available leisure time and access to books of families with low SES. In Chile, nationally representative statistics show that, on average, people with low SES read less frequently than those with high SES. For example, data from a national survey showed that Chilean people's reading frequency was positively correlated to their head-of-household's educational level (Consejo Nacional de la Cultura y las Artes, 2014). Indeed, of all participants whose head-of-household had at least some tertiary education, 66% declared reading at least one book for pleasure the previous year and 33% consider themselves to be frequent readers; compared to 40% and 11%, respectively, for those whose head-of-household had not completed secondary education. Furthermore, Chilean data suggest that a significant and positive correlation exists between household income and number of books at home (Consejo Nacional de la Cultura y las Artes, 2011). Given that research suggests that readers thrive in book-rich environments (Au & McQuillan, 2001; Gambrell, 2011; Neuman & Roskos, 1993; Nieuwenhuizen, 2001), it is likely that children who have large libraries at home will read more than those who do not own as many books. Thus, data suggest that Chilean parents with low SES might be less likely to be motivated readers than those with high SES.

Yet, the relationship between families' SES and children's reading motivation might be partially mediated by parents' levels of reading motivation and frequency. Some scholars have found that when they estimated the correlation between parents' SES and children's reading frequency while controlling for parents' reading frequency or motivation, SES measures were no longer significant predictors of children's reading frequency or motivation (DeBarshye, 1995; McKool, 2007; Neuman, 1986). These findings suggest that the effect of families' SES on children's reading motivation might be mediated by parental pro-reading attitudes or behaviors. More research is needed to confirm whether this is also true for Chilean families.

Parents' Expectations

Parents may also influence their children's reading motivation through the academic expectations they hold for them. Parents who expect their children to achieve post-secondary education, for example, are likely to consider reading as a useful tool and might communicate these beliefs to their children through conversations and behaviors. Thus, parents' high academic expectations might influence their children's value of reading and, indirectly, their motivation to read. For example, the results of one study with nearly 900 fourth graders in Switzerland show that a positive and significant association exists between parents' expectations and their children's reading enjoyment and curiosity (Villiger et al., 2014).

Peers' Reading Achievement

Peers can also be a source of influence for adolescents. Researchers have described adolescence as a period when peers become an important referent for identity construction (Alexander & Fox, 2011; Wentzel, 2017) and whose influence can be associated with students' academic performance (Epple & Romano, 1998; Gottfried et al., 2001; Hoxby, 2000) and academic motivation (Altermatt & Pomerantz, 2003; Berndt et al., 1999; Chen et al., 2003; Kindermann & Vollet, 2014; Wentzel & Muenks, 2016). Indeed, researchers have found that adolescents' engagement in school-related behavior is positively associated with the positive norms and values embraced by their peers (Hamm et al., 2013; Shin et al., 2007; Wang & Eccles, 2012). Thus, it seems reasonable to hypothesize that students' classroom mean of past reading achievement might be associated with students' own reading motivation, which explains why it was included as a control variable in this study.

The Present Study

Few studies have explored how parents and peers might shape adolescents' reading motivation, and none have examined that association while controlling for students' previous achievement. To contribute to fill this gap, this study presents an examination of the association between parents' reading motivation and their eighth- and tenth-grade children's reading motivation, while controlling for their own and their classmates' past reading achievement. The research questions were:

1. To what extent are Chilean parents and adolescents motivated readers? Do parents' and adolescents' reading motivation vary across socioeconomic quintiles?
2. Are parents' own leisure reading frequency and reading motivation significantly associated with students' reading motivation, after controlling for the potential influence of their own and their peers' past reading achievement?

3. Is the association between students' SES and their reading motivation mediated by parents' reading motivation?

Methods

Data

Data for this study were collected by the Chilean Agency for Educational Quality (CAEQ). Once a year, the CAEQ administers the Chilean System for Measurement of Educational Quality (SIMCE; acronym in Spanish). The SIMCE assessment is a series of standardized tests (usually math, reading, social sciences and natural sciences) and questionnaires, administered during two consecutive days in late spring. All students—regardless of the type of school they attend—in the selected cohorts (usually fourth, eighth, and tenth grade) are required to take the tests, which are aligned with the national curriculum.

Additionally, students, parents, and teachers respond questionnaires that ask about families' socioeconomic backgrounds, teachers' instructional practices, and additional topics (i.e., bullying, physical health, substance abuse, etc.) that vary each year. In 2015, the questionnaire asked students and parents about their reading motivation and leisure reading frequency. For this study, parents' and students' answers to the 2015 questionnaire were used, as well as students' previous reading score, obtained in 2013. Researchers may request access to SIMCE data through their website (www.agenciaeducacion.cl).

The data set represented all Chilean students who attended eighth and tenth grade (mean = 15.74 years old) in 2015: a total of 546,474 students. The sample consisted of all students with valid 2015 reading scores who responded the student questionnaire and turned in the parents' questionnaire: 329,840 students, 50% of whom were female. Of the sample, 54% were eighth graders (mean age = 13.64 years old) and 46% were tenth graders (mean age = 15.71 years old). According to their parents, 12% of the students had indigenous origins—either the mother or the father declared belonging to an indigenous group (e.g., Aymara, Rapa Nui, Quechua, Mapuche, Atacameño, Coya, Kawéskar, Diaguita or Yagán).

Missing Values

Analysis of missing values' patterns showed that 74% of the students in the sample had valid values in all variables. Most students who had missing values corresponded to those with complete data except for their previous reading score (14% of the sample), and a small portion had complete data except for their indigenous origin (4% of the sample). The rest of the students showed various missingness patterns, each accounting for less than 1% of the sample. Given that students' previous reading scores were a key predictor in this study, multiple imputation (MI) was used.

MI consists in the prediction of a set number of values for each missing value. MI allows for complete-data analyses through inferences based on the combination of imputed data sets which, as a set, "validly reflect sampling variability due to missing values" (Little & Rubin, 2002).

The Stata command "mi impute chained" was used to impute 25 data sets with 10 iterations to predict values in all variables that had missing values (StataCorp., 2017). The MI model included all variables of interest in this study. Variables with no missing values were included as predictors: students' gender, students' age, type of school, schools' SES, and schools' location. The imputation model was set to estimate missing values in each variable with missing values according to their structure and type: regression for students' previous reading; truncated regressions for students' and parents' reading motivation; ordinal logistic regressions for parental expectations, mothers' and fathers' level of education, income, number of people in the household, students' and parents' reading frequency, and number of books at home; and logistic regression for indigenous origin. Derivative variables such as students' and parents' reading motivation were imputed as scales. Families' SES composite variable was passively estimated after MI of its three subvariables (mothers' education level, fathers' education level, income).

Models in this study were estimated using these 25 imputed data sets. The Stata command "mi estimate" (StataCorp., 2017) estimates models using the imputed data and adjusting coefficients and standard errors for the variability between imputations, according to Rubin's combination rules (Rubin, 1987).

Variables

All variables included in these analyses are summarized in Tables 1 and 2. Correlations between variables can be found in Table 3.

Outcome Variable

Students' reading motivation was used as the outcome variable. Students rated their agreement with 11 items (e.g., "Reading is one of my favorite hobbies," "I like to exchange books with my friends") on a 4-point Likert scale regarding their reading motivation (1 = "Strongly disagree," 4 = "Strongly agree"). These items were identical to those used in the Reading Enjoyment (JOYREAD) scale used in the 2009 PISA Student Questionnaire.[1] Negative items were reverse coded (e.g., "I read only if I have to"). Using the same method reported in the 2009 PISA technical report (OECD, 2012, p. 345), a single scale was estimated as a ratio of the sum of all validly answered items over the maximum score of valid responses (mean = 0.63, *SD* = 0.17, Cronbach's alpha = 0.90). Questions with

TABLE 1
Summary of Variables

Variables	*N*	Range	Missing	Mean	*SD*
Level 1 variables					
Students' reading motivation	327,644	0.25–1	1%	0.63	0.17
Students' previous reading score	319,853	107.47–369.02	18%	258.60	48.84
Parents' reading motivation	324,957	0.25–1	1%	0.71	0.16
Parents' leisure reading	323,022	1–4	2%	2.41	1.06
Socioeconomic status (SES) composite	328,533	−3.85 – 3.25	0%	0.00	1.00
N° of people in household	324,336	2–10	1.7%	4.54	1.53
Students' gender (1 = female)	329,840	0/1	0%	0.50	0.50
Indigenous origin (1 = yes)	306,697	0/1	7%	0.12	0.32
Parental expectations	322,690	1–6	2%	4.75	1.09
N° of books at home	323,784	1–5	2%	3.01	1.01
Level 2 variables					
Classroom mean previous reading score	115.01–346.42	329,581	1%	257.58	26.22
Type of school			0%		
Public	121,938				
Private with public funding	183,798				
Private	24,104				
Schools' SES level			0%		
Low	52,261				
Medium-low	108,047				
Medium	95,573				
Medium-high	48,107				
High	25,852				
Schools' location			0%		
Urban	309,028				
Rural	20,812				

missing value did not contribute to the maximum score. MI was used to estimate the reading motivation level of students' whose questionnaires had missing values in all 11 items (1% of the sample).

Predictors

The predictors in this study were parents' self-reported reading motivation and leisure reading frequency. The items that asked about parents' reading frequency and reading motivation were identical to those in the 2009 PISA parent questionnaire. One parent per student reported how often the parent read for enjoyment (1 = "Never or almost never," 4 = "Every day or almost every day"). The mean frequency was 2.41 (SD = 1.06, missing before MI = 2%).

Parents also rated their agreement on a 4-point Likert scale with seven items regarding their reading motivation (e.g., "I like to spend my time reading," "I enjoy reading"). Negative items were reverse-coded. Using the same method reported in the 2009 PISA technical report, a single scale was estimated as a ratio of the sum of all validly answered items over the maximum score of valid responses (mean = 0.71, SD = 0.16, Cronbach's alpha = 0.90). Questions with missing value did not

TABLE 2
Pairwise Correlations between Variables

		1	2	3	4	5	6	7	8	9
1	Students' reading motivation	1.00								
2	Students' previous reading score	0.28	1.00							
3	Parents' reading motivation	0.18	0.14	1.00						
4	Parents' reading frequency	0.19	0.11	0.41	1.00					
5	Socioeconomic status composite	0.12	0.30	0.27	0.17	1.00				
6	People in household	−0.02	−0.06	−0.01	0.01	−0.03	1.00			
7	Students' gender (1 = female)	0.32	0.08	0.01	0.03	−0.11	0.01	1.00		
8	Indigenous origin (1 = yes)	−0.02	−0.06	−0.05	−0.01	−0.18	0.21	−0.01	1.00	
9	Parental expectations	0.19	0.32	0.23	0.16	0.46	−0.05	0.08	−0.09	1.00
10	N° books at home	0.18	0.24	0.30	0.26	0.48	0.05	0.03	−0.11	0.32

Note: All shown correlations are significant at $p < .05$ or less.

contribute to the maximum score. MI was used to estimate the reading motivation level of parents' who had missing values in all 7 items (1% of the sample).

Level 1 Control Variables

Binary variables for students' gender (female = 1) and ethnicity (indigenous = 1) were included. Students' were coded as having indigenous origin if either their mother or their father identified as part of an indigenous group (e.g., Aymara, Rapa Nui, Quechua, Mapuche, Atacameño, Coya, Kawéskar, Diaguita or Yagán). Additionally, a count of the people living in each household was included, which was reported by parents as ordinal choices. This variable was recoded as interval ratio (e.g., "2 people" = 2, "10 or more people" = 10). Parents also reported the highest educational level they expected their children to attain (1 = "I don't think she/he will complete high school," 6 = "Postgraduate studies"). About 1% of the parents believed that their children would not complete high school, 9% believed that their children would only earn a high school degree, 19% believed children would earn a technical degree, 50% believed they would earn a university degree, and 21% believed they would complete postgraduate studies.

Students' 2013 SIMCE reading score, which was their most recent previous reading score available, was also included. The SIMCE reading assessment is a reading comprehension standardized test that is aligned to the national curriculum. For tenth graders', their eighth grade reading score was used (mean = 262.92, SD = 48.38, missing before MI = 21%); and for eighth graders', their sixth grade reading score (mean = 254.94, SD = 48.93, missing before MI = 16%). Reading proficiency for eight and sixth graders, as measured by this test, is described in the supreme decree N°129/2013 and N°225/2017, respectively, issued by the Ministry of Education[2]. For example, to be considered proficient readers, eighth graders' need to be able to identify the main theme or purpose of a text, reach a conclusion based on evidence presented in a text, compare information presented by various texts, infer causes and consequences of events or information presented in texts, infer intentions and emotions of characters in texts, infer the meaning of words based on their contexts, assess how well a text achieves its purpose, distinguish between fact and opinion, express personal opinions based on evidence from a text, among other skills.

Previous reading achievement was included as a control variable given that, through longitudinal analyses, scholars have found that students' reading achievement at time 1 significantly correlates to their reading motivation at time 2 (Hebbecker et al., 2019; Morgan & Fuchs, 2007; Toste et al., 2020). In this study, students' reading score in 2013 was positively and significantly correlated to their reading motivation level in 2015 ($r = 0.28$, $p < .001$).

To depict families' SES, a composite variable was developed using parents' level of education and household income. In the parent questionnaire, parents or caregivers reported mothers' and fathers' level of education (1 = "Did not study," 20 = "Doctorate degree"). Mothers' mean number of years of education was 12.78 (SD = 3.56, missing before MI = 3%), while fathers' mean number of years of education was 12.72 ($SD = 3.77$, missing before MI = 7%). These two variables were significantly correlated at 0.64 ($p < .001$). Parents also reported their total

TABLE 3
Results for Multilevel Fixed-Effects Regression Models

	Model 1			Model 2		
Fixed effects	*B*	SE	f^2	*B*	SE	f^2
Previous reading score	0.00***	0.00	0.04	0.00***	0.00	0.04
10th grade (Ref = 8th)	0.01*	0.00	<0.001	0.00***	0.00	<0.001
Indigenous origin (1 = yes)	0.00***	0.00	<0.001	0.00**	0.00	<0.001
Gender (1 = female)	0.10***	0.00	0.11	0.10***	0.00	0.10
People in household	−0.00***	0.00	<0.001	−0.00***	0.00	<0.001
Parental expectations (1–6)	0.01***	0.00	0.01	0.01***	0.00	<0.01
Socioeconomic status composite	−0.00***	0.00	<0.001	−0.01***	0.00	<0.001
Books at home (Ref = none)			0.01			0.01
<10	0.02***	0.00		0.01***	0.00	
Between 11 and 50	0.03***	0.00		0.02***	0.00	
Between 51 and 100	0.05***	0.00		0.03***	0.00	
More than 100	0.08***	0.00		0.05***	0.00	
Type of school (Ref = public)			<0.001			<0.001
Private w/public funding	−0.03***	0.00		−0.01***	0.00	
Private	−0.01***	0.00		−0.03***	0.00	
School SES (Ref = low)			<0.001			<0.001
Medium low	0.00	0.00		0.00	0.00	
Medium	0.00	0.00		0.01***	0.00	
Medium-high	0.00**	0.00		0.01***	0.00	
High	−0.00	0.00		−0.00	0.00	
School location (1 = rural)	0.01***	0.00	<0.001	0.01***	0.00	<0.001
Class mean of previous reading score	0.00***	0.00	<0.001	0.00***	0.00	<0.001
Parents' reading motivation				0.08***	0.00	0.01
Parents' reading frequency (1 = never)						0.01
Once or twice a month				0.02***	0.00	
Once or twice a week				0.03***	0.00	
Every day or almost every day				0.05***	0.00	
Intercept	0.24			0.29		
Between-classroom variance	<0.001			<0.001		
Within-classroom variance	0.0219			0.0214		
N	329,840			329,840		
Proportion of variance explained	19%			21%		

Note: f^2 averaged across 25 imputed data sets.
*$p < .05$, **$p < .01$, ***$p < .001$.

household income (1= "Less than CLP$100.000," 15 = "More than CLP$2.200.000"). The relationship between these three variables was explored using exploratory factor analysis, which showed that all variables loaded to a single factor, suggesting that, combined, they portrayed a single construct. After each variable was standardized, a SES scale was created that combined the three variables, which was also standardized. The scale showed high reliability (Cronbach's alpha = 0.82).

The number of books at home was also included as an ordinal variable (0 = No books, 5 = Over 100 books). Approximately 3% reported not having books at home, 30% had less than 10 books, 39% had between 10 and 50 books, 16% had between 51 and 100 books, and 11% had over 100 books (missing before MI = 2%).

Level 2 Control Variables

The classroom average of students' previous reading score was included as a control variable (mean = 257.58, SD = 26.22, missing before MI = 1%). Previous research with Chilean students also used classroom-level means to account for peer effects (Canales & Webb, 2018; McEwan, 2003; Vial & Sapelli, 2004). Understanding 'peers' as classmates is appropriate for this context, given that Chilean students remain in their homeroom classroom with the same group of students throughout the whole school day every day of the week. Teachers move from room to room, not students. Thus, classmates spend a considerable amount of time together, which offers multiple opportunities to influence each other.

Additionally, schools' socioeconomic category and type were included. Researchers from the Chilean Ministry of Education classify schools into five socioeconomic categories: low (serving 16% of the students in this study), medium low (33%), medium (29%), medium-high (14%), and high (8%). To classify schools, they consider students' household income, their parents' level of education, and the percentage of students each school serves who are classified at the two highest vulnerability categories in the vulnerability index. The Chilean vulnerability index is a composite variable calculated by the JUNAEB (National Board of School Assistance and Scholarships, in Spanish) which considers students' and their families' participation in social services, public health insurance, and scholarships, as well as students' school attendance and academic achievement. They classify all students into four categories: first priority (for those with the highest vulnerability score), second priority, third priority, and non-priority.

In 2015, three types of schools existed in Chile: public schools which depended both in funding and administration on local municipalities (serving 37% of students in this study); private schools with subsidized funding, which were privately administered but received public as well as private funding (serving 56% of students in this study), and private schools, which were privately funded and administered (serving 7% of students in this study). Schools are classified as rural (serving 6% of students in this study) or urban (serving 94% of students in this study) according to their location.

Analysis

Two multilevel models were used to answer the research questions. For both models, the outcome variable was students' reading motivation in 2015 (MOT). Multilevel modeling was needed to account for the nested structure of the data (Luke, 2004). Two two-level random-intercept models were estimated with students (level 1) clustered in classrooms. While classrooms were also nested within schools, three-level modeling was not possible for this data set. Over 43% of schools in the sample included only 1 classroom in the data set, and 68% had 2 or less. Previous research suggests that this small number of level 2 units (classrooms) per level 3 groups (schools) could result in biased estimates (Lee & Hong, 2021).

An unconditional model was used to calculate the intraclass correlation coefficient, which was found to be 0.06. This coefficient suggested that about 6% of the variance in students' reading motivation level can be attributed to between-classroom differences, while 94% represents within-classroom differences.

Model 1: Covariates Model

The first conditional model included all student-level control variables (STU): grade, indigenous origin, gender, number of people in the household, parental expectations, family SES, number of books at home; all classroom-level control variables (CLASS): type of school, school SES level, and school location; as well as two student-level variables suggested by previous research: students' reading score in 2013 (ACH) and the classroom mean of students' 2013 reading score (PEERS). All effects were entered as fixed. Students' previous reading achievement and their classmates' reading achievement was hypothesized to significantly predict their reading motivation in 2015, even when controlling for other relevant covariates.

$$MOT_{ij} = \beta_0 + \beta_1 STU_{1ij} + \beta_2 ACH_{2ij} + \beta_3 PEERS_{3ij} + e_{ij}$$

$$\beta_0 = \gamma_{00} + \gamma_{01} CLASS_j + u_{0j}$$

$$\beta_1 = \gamma_{10}$$

$$\beta_2 = \gamma_{20}$$

$$\beta_3 = \gamma_{30}$$

Model 2: Parents' Reading Habits Model

The second conditional model included all control variables in the previous model and two additional

student-level variables: parents' leisure reading frequency (PFREQ) and parents' reading motivation (PMOT). The goals of this model were to see whether parents' reading motivation and leisure reading frequency could significantly predict students' reading motivation, while controlling for all relevant covariates. All effects were entered as fixed. Parents' reading motivation and leisure reading frequency were hypothesized to significantly predict students' reading scores.

$$MOT_{ij} = \beta_0 + \beta_1 STU_{1ij} + \beta_2 ACH_{2ij} + \beta_3 PEERS_{3ij} + \beta_4 PFREQ_{4ij} + \beta_5 PMOT_{5ij} + e_{ij}$$

$$\beta_0 = \gamma_{00} + \gamma_{01} CLASS_j + u_{0j}$$

$$\beta_1 = \gamma_{10}$$
$$\beta_2 = \gamma_{20}$$
$$\beta_3 = \gamma_{30}$$
$$\beta_4 = \gamma_{40}$$
$$\beta_5 = \gamma_{50}$$

Effect Sizes

The total proportion of variance explained by each model was calculated according to the component-based measure described by LaHuis et al. (2014, p. 4), which was based on Snijders and Bosker's (1994) method. This method has been shown to be appropriate for random intercept multilevel models like the ones in this study (LaHuis et al., 2014). Then, to quantify the effects of the different variables in the model, Cohen's f^2 was estimated based on the method described by Selya et al. (2012). Cohen's f^2 is a standardized effect size of the Pearson's r family which corresponds to the ratio of the variance attributable to an independent variable over the total variance. Like other standardized effect sizes, it can be used to compare the predictive power of different variables in a multiple regression model.

Following Selya et al. (2012), models were estimated while removing one predictor at a time. The effect size obtained for each predictor (f_b^2) resulted from a comparison of the proportion of variance explained in the full model (R_{ab}^2) to the proportion of variance explained in the full model minus the predictor (R_a^2). Effect sizes were estimated considering changes to the total proportion of variance explained at levels 1 and 2. The equations used to calculate effect sizes were the following:

$$R^2 = 1 - \frac{\left(\sigma^2_{full} + \tau_{00full}\right)}{\left(\sigma^2_{null} + \tau_{00null}\right)}$$

$$f_b^2 = \frac{R_{ab}^2 - R_b^2}{1 - R_{ab}^2}$$

According to Cohen (1988, p. 413-414), an f^2 of 0.02 is considered small, representing about 2% of the explained variance in the dependent variable; an f^2 of 0.15 is considered medium, representing 13% of the explained variance; and an f^2 of 0.35 is considered large, representing 50% of the explained variance.

Very little research exists on the estimation of effect sizes using multiple imputed data sets. To obtain estimations that considered all 25 imputed data sets, both models were run across each of the 25 data sets, and then the mean effect size was calculated for each variable. In the absence of a more precise approach, this method provides an approximate idea of what the effect size for each variable would be if the data set had no missing data. A similar approach has been recommended to calculate R^2 with multiple imputed data sets (van Ginkel, 2019).

Results

Results obtained from several analyses are summarized as they correspond to each of the research questions.

Question 1: Parents' and Adolescents' Reading Motivation Across Socioeconomic Status Quintiles

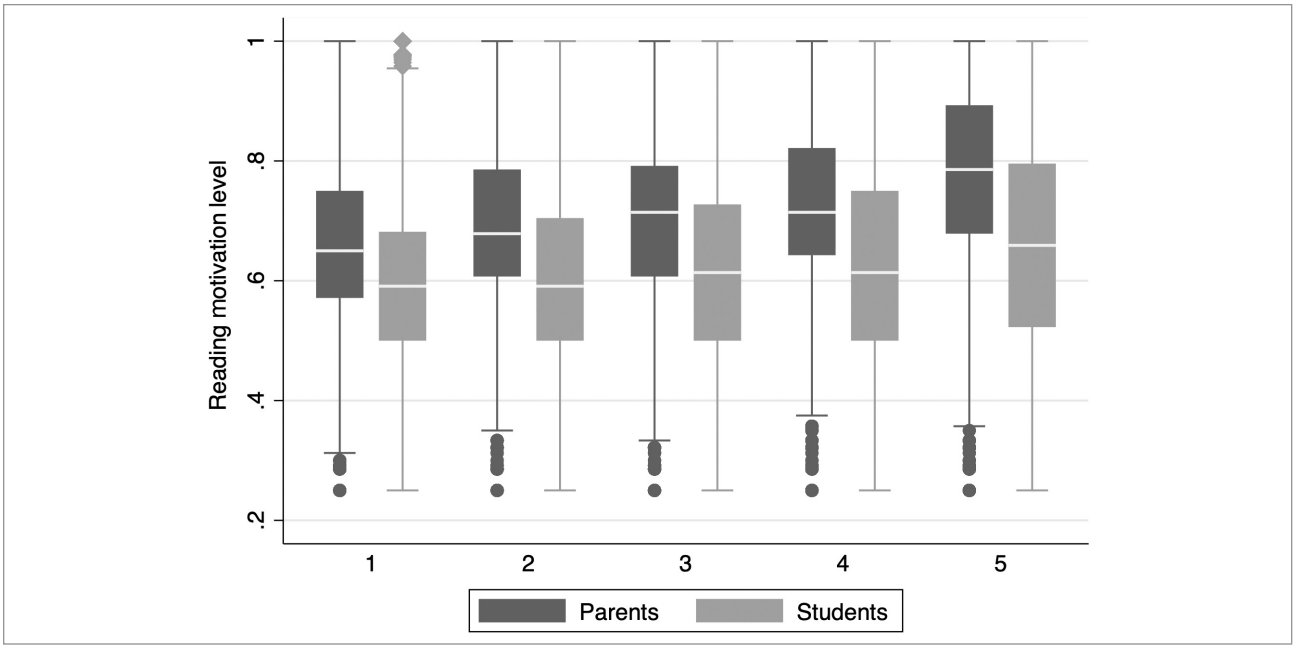
Parents' and adolescents' reading motivation level were compared across SES quintiles, using the SES composite. As expected from previous literature, parents' mean reading motivation and their children's reading motivation increased with each quintile (see Figure 1). Analysis of variance (ANOVA) with Bonferroni adjustments for multiple comparisons showed that these mean differences were significant for all possible combination of pairs of quintiles, with means at higher quintiles being always significantly higher than those at lower quintiles (all differences significant at $p < .001$).

Question 2: Association between Parents' and Children's Reading Motivation

Students' reading motivation was found to be positively and significantly correlated to parents' reading motivation ($r = .18$, $p < .001$) and parents' reading frequency ($r = .19$, $p < .001$). Yet, these correlations were found to be small compared, for example, to the association between individuals' motivation and their previous reading achievement ($r = .28$, $p < .001$) and being female ($r = .32$, $p < .001$).

To explore these associations while controlling for other covariates, two multilevel regression models were estimated using 25 multiple imputed data sets (see Table 3). While running sensitivity analyses, both models were estimated before MIs with complete cases using

FIGURE 1
Parents' and Students' Reading Motivation by SES Quintiles



Note. All Means are Significantly Different from Each Other ($p < .001$).

listwise deletion, and the results were found to be almost identical. Results before MI are available upon request.

As it usually happens in behavioral sciences, the proportion of variance explained by the two models represented only a small percent of the total variance (Cohen, 1988). Model 1 explained 19% of the variance across students' reading motivation and Model 2 explained 21% of the variance, which suggested that Model 2 might better fit the data. The fit of both models was further assessed by conducting likelihood-ratio tests that compared the results of Model 1 to those of Model 2 in every multiple imputed data set. In all analyses, Model 2 consistently provided a better fit for the data.

Parents' reading motivation was estimated to predict students' reading motivation positively and significantly. A one-unit increase in parents' reading motivation was associated with a 0.08 unit increase in students' reading motivation ($p < .001$). Parents' leisure reading frequency was also estimated to positively predict students' reading motivation. Students whose parents' declared reading for pleasure every day or almost every day were estimated to have a reading motivation level 0.05 units larger than that of students' whose parents declared never reading for pleasure. Combined, parents' reading motivation ($f^2 = 0.01$) and parents' leisure reading frequency ($f^2 = 0.01$) were estimated to have a small effect size on students' reading motivation.

The association between parents' and students' reading motivation was further explored by comparing two separate, identical models for students in eight and tenth grade with the same variables in Model 2, except grade. Results showed that the association between parents' and students' reading motivation was positive and significant for students in both grades, with equivalent effect sizes ($f^2 = 0.01$). These results are available upon request.

The variable with the largest effect size in Model 2 was students' gender. Consistent with previous literature, female students' reading motivation was estimated to be 0.10 units higher than that of male students ($p < .001$). Gender explained 10% of the variance ($f^2 = 0.10$), which may be considered a small-medium effect size (Cohen, 1988). This effect size is larger than that reported by Marinak and Gambrell (2010) for third graders in the United States (Cohen's $d = 0.48$, equivalent to Cohen's f^2 of 0.06), and by Retelsdorf et al. (2011) among fifth to eight graders in Germany (Pearson's $r = 0.21$, equivalent to Cohen's f^2 of 0.05). The associations reported by Marinak and Gambrell (2010) and Retelsdorf et al. (2011) were estimated between only two variables and did not consider the potential variance explained by other variables. Thus, the effect of being female seems especially significant for Chilean adolescents, given that the effect size found for gender in this study was larger than those reported elsewhere, even when controlling for other relevant variables.

Results from Model 2 also showed that students' reading score in 2013 positively and significantly predicted their reading motivation level in 2015: each 10-point increase in students' reading score was estimated to increase students' reading motivation by 0.007 units. This variable explained 4% of the variance of the model, which is considered a small effect size (Cohen, 1988), but larger than that of parents' leisure reading frequency and reading

motivation combined. Classrooms' mean reading achievement was not found to be a significant predictor of students' own reading motivation, after controlling for other variables.

Families' number of books at home was found to be positively and significantly associated with students' reading motivation. Specifically, students whose parents reported having more than 100 books at home were estimated to have a reading motivation level larger in 0.05 units than their peers who had no books at home. Yet, the effect size for books at home was minimal ($f^2 \leq 0.001$), when controlling for other variables in the model.

Similarly, parental expectations were also found to positively and significantly predict students' reading motivation. Each additional educational level attained as expected by parents for their children was estimated to increase students' reading motivation by 0.01 units ($p < .001$), but the effect size for parental expectations was very small ($f^2 < 0.001$).

While controlling for other relevant covariates, Chilean tenth graders' reading motivation was estimated to be 0.003 units lower than that of eighth graders ($p < .001$), yet the effect size for grade was extremely small ($f^2 < 0.001$). This finding is consistent with literature that suggests that students' motivation declines throughout the school years (Gottfried et al., 2001; Muenks et al., 2018; Scherrer & Preckel, 2019).

The SES composite variable was significantly and negatively correlated to students' reading motivation level ($p < .001$), yet its effect size was almost negligible ($f^2 < 0.001$) when accounting for other variables. Preliminary analyses had shown that there was a positive and significant correlation between families' income and the number of books they had at home ($r = 0.46$, $p < .001$), and between students' reading motivation and their SES ($r = 0.12$, $p < .001$). Thus, finding that the SES was negatively associated with students' reading motivation when controlling for other variables in the model was surprising, but consistent with previous research that had reported that the significance of SES disappeared when parents' reading behaviors were included as control variables in the models (DeBarshye, 1995; McKool, 2007; Neuman, 1986).

Question 3: Parents' Reading Motivation as a Mediator

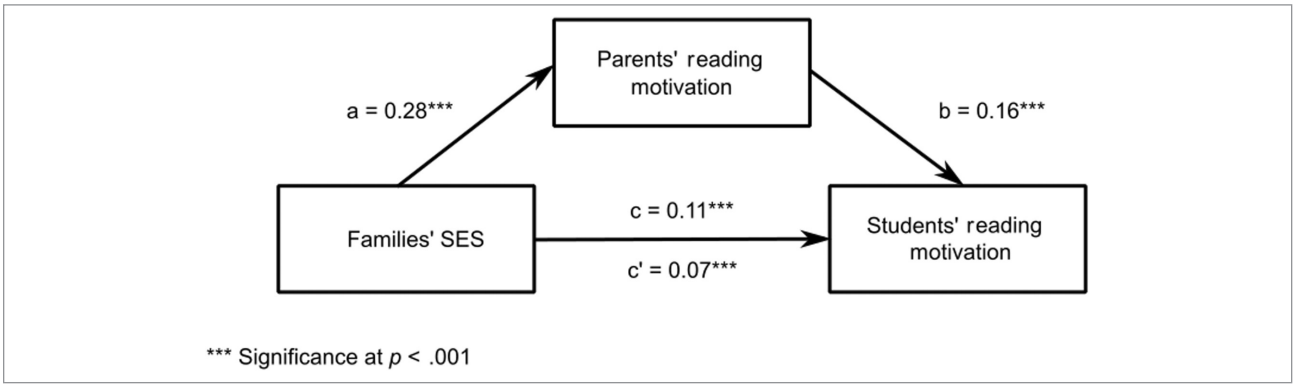
The association between families' SES, parents' reading motivation, and students' reading motivation was further examined using mediation analyses. Following Baron and Kenny's (1986) method, three additional simple regressions were estimated to assess whether the relationship between families' SES and students' reading motivation was partially mediated by parents' reading motivation (see Figure 2).The results indicated that parents' reading motivation partially mediated the relationship between families' SES and students' reading motivation. The direct effect of families' SES on students' reading motivation was significant ($\beta = 0.11$, SE = 0.00, $p < .001$). The direct effect of parents' reading motivation on student's reading motivation was also significant ($\beta = 0.16$, SE = 0.00, $p < .001$). When parents' reading motivation was added as a mediator, the effect of families' SES on students' reading motivation decreased ($\beta = 0.07$, SE = 0.00, $p < .001$), indicating that parents' reading motivation accounted for a significant portion of the total effect. The indirect effect of families' SES on students' reading motivation through parents' reading motivation was significant ($\beta = 0.04$, SE = 0.00, $p < .001$), suggesting partial mediation. Estimated effect size indicated that parents' reading motivation accounted for approximately 38% of the total effect of families' SES on students' reading motivation (proportion mediated).

Discussion

Parents' Reading Motivation and Frequency Matter

Results show that parents' reading motivation and leisure reading frequency predict their children's reading

FIGURE 2
Path Model for Mediation Analysis



motivation, even when controlling for strong covariates such as their previous reading scores and their classmates' reading motivation. This finding is consistent with models of reading motivation (de Naeghel, Valcke, et al., 2014; Guthrie & Wigfield, 2000; McKenna, 1994; Schwanenflugel & Knapp, 2016) and with findings suggested by some previous studies (Agencia de Calidad de la Educación, 2016; Arua & Arua, 2011; Bråten et al., 1999; Lim et al., 2015; McKool, 2007; Yeo et al., 2014). The effect size found for parents' reading motivation and leisure reading frequency was smaller than that equivalent to the zero-order correlations reported by Lim et al. (2015), probably because this model included other relevant variables that contributed to explain variance. Lim et al. (2015) studied 16-year-old Koreans and their parents and found that children's positive reading attitude correlated to their parents' attitude toward reading at $r=0.20$ (equivalent to Cohen's f^2 of 0.04) and to their parents' reading frequency at $r=0.11$ (equivalent to Cohen's f^2 of 0.01). Nevertheless, a comparison of the zero-order correlations in this and Lim et al.'s data sets suggests that the association between adolescents' and their parents' reading motivation is very similar in Korea and Chile ($r=0.20$ in Korea, 0.18 in Chile), yet the correlation between adolescents' reading motivation and their parents' leisure reading frequency is larger in Chile than Korea ($r=0.11$ in Korea, $r=0.19$ in Chile).

This study strengthens the conclusions of previous studies by using rigorous methods. For example, unlike Arua and Arua (2011), Bråten et al. (1999), and Yeo et al. (2014), this study used a very large data set: a population-wide sample of nearly 350,000 students who attended eight and tenth grade in 2015 in Chile. Lim et al. (2015) also used large data sets, but they suspected collinearity issues. Moreover, this study used MI, which is considered an effective method to avoid possible biases due to missing data (van Ginkel et al., 2020).

These findings confirmed previous research that suggested that students' reading motivation is associated with their parents', even in secondary school (Arua & Arua, 2011; Chen, 2008; Lim et al., 2015). Models in this study included an aggregated variable that represented the classroom mean of previous reading achievement as a control variable, which had not been done in previous studies. The presence of this classroom-level variable acknowledges students' developmental stage and confirms the theories that describe adolescence as a time when peers become an important source of influence (Alexander & Fox, 2011; Wentzel et al., 2007). Findings showed that parents' reading motivation was estimated to significantly predict students' reading motivation even while accounting for the influence of their classmates' achievement. In fact, the classroom mean variable was not found to be a significant predictor of students' reading motivation. The significance of parent-related variables while accounting for peer effects is a novel result that should underscore the importance of parents becoming reading models for their adolescent children. Future longitudinal research could compare the strength of the association between parents' and their children's reading motivation across the years. Given that peers are not as influential during childhood as during adolescence, it would not be surprising to find that parents' and children's reading motivation are more strongly associated when children are young.

Conscious of the long-term benefits of reading, policymakers should complement parents' efforts by developing policies to ease parents' access to interesting books. Due to their proximity to families, school libraries could provide an effective way to facilitate parents' access to books if they were also stocked with books for adults. Furthermore, schools could foster close relationships between teachers and parents, to join their efforts on nurturing keen readers. For example, educators should strive to understand the literacy practices particular to each community they serve to be able to include them inside their classrooms. Schools could be places where families' knowledge and practices are valued, and where parents are invited to interact with their children's learning rather than only be informed about it (Turner, 2019). More research is needed to understand how Chilean schools are including parents in their efforts to foster motivated readers.

Additionally, out-of-school community literacy programs in community centers and public libraries that value and boost families' literacy practices might be effective in fostering adolescents' *and* their parents' intrinsic interest in reading. If designed for a specific community, these programs are likely to be more culturally relevant for the members of each community than general efforts that occur in large and diverse high schools. Likewise, the out-of-school environment might allow program leaders to foster adolescents' intrinsic reading motivation away from the pressure of grades and tests.

Concerns and Hope for Adolescents with Low Socioeconomic Status

It had been hypothesized that SES would be especially influential in Chile due to its impact in reducing families' access to books. In the 2014 Chilean national reading survey, 42% of Chilean students between 9 and 14 reported reading books their parents had bought for them, while only 15% declared borrowing books from libraries (Consejo Nacional de la Cultura y las Artes, 2014). Given that readers thrive in print-rich environments (Au & McQuillan, 2001; Gambrell, 1996; Neuman & Roskos, 1993) and that most Chilean students report that their parents buy the books they read and that they seldom visit libraries, it is logical to conclude that Chilean children with low SES are rarely in print-rich environments. Indeed, data showed that a

positive and significant correlation existed between families' income and the number of books they had at home.

Therefore, it was surprising to see that multilevel regression results showed a small effect size associated to families' SES, and even more surprising to find that families' SES was negatively associated with students' reading motivation. Since SES and reading achievement are moderately correlated ($r = 0.28$, $p < .001$, in this study), it could be the case that students' previous score is partially accounting for the influence of SES on students' reading motivation. Furthermore, mediation analyses showed that the relationship between families' SES and students' reading motivation was mediated by parents' reading motivation, as previous research had suggested (Hansen, 1969; Neuman, 1986; Rowe, 1991).

The significance of parents' reading motivation as a mediator between SES and students' reading motivation provides hope for students with low SES. These students' teachers might not be able to boost adolescents' reading motivation directly by affecting their families' SES, as they are unlikely to increase parents' income or level of education. However, teachers who understand that the association between SES and reading motivation works, in part, through parents' reading motivation could strive to promote all parents' proreading behaviors and attitudes, especially of those with low SES. High levels of reading motivation in families with low SES could help mitigate the direct negative effect that SES has on students' reading motivation.

Effect sizes suggested that, keeping all other variables constant, parents' reading motivation and leisure reading frequency explained more of the variance than their SES. However, no parent-related variable seemed as powerful as other variables. For example, the effect sizes of being a female student and of students' previous reading score were larger than that of SES, parents' reading motivation, and parents' leisure reading frequency combined. Future research could explore through experimental interventions if parents' behaviors and attitudes can increase students' reading motivation and if the effect could compensate for the difference between genders.

Limitations

Most data used in this study were self-reported which, especially in the case of reading motivation and reading frequency, might be affected by social-desirability biases. A large sample, confidential responses, and low stakes might reduce the impact of such biases, but still, there is no easy way to confirm whether students and parents were honest in their reports. MI was used to reduce possible biases in the missing data as much as possible.

Conclusion

The results of this study provide hope in the quest to foster students' reading motivation. It is true that SES is associated with the development of adolescents' reading habits, but even in countries like Chile where there is high socioeconomic inequality, results showed that other more malleable factors can also predict reading motivation. Parents' reading motivation and frequency are correlated with their children's reading motivation, even when controlling for students' reading achievement and their classmates' reading achievement.

The main contribution of this study is the strength of its methods due to the use of a large data set and powerful control variables. This study robustly confirms what previous research had suggested: adolescents' reading motivation is positively associated with their parents' reading motivation and leisure reading frequency. The findings reported here should encourage stakeholders to promote the love of reading in not only children but also their parents.

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No funding was provided for this project.

Conflict of Interest

No conflicts of interest to disclose.

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Data Availability Statement

Data for this project were collected by the Agencia para la Calidad de la Educación, a Chilean Government agency. Researchers may request access to the same data sets used in this paper through the Portal Transparencia platform (portaltransparencia.cl), administered by the Chilean Government.

NOTES

[1] The original scale was validated using Item Response Theory. For more information on its creation and validation, please refer to the PISA 2009 technical report (OECD, 2012).

[2] Decree N°129/2013 available at https://www.bcn.cl/leychile/navegar?idNorma=1052679 and decree N°225/2017 available at https://www.bcn.cl/leychile/navegar?idNorma=1111891.

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