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Home Language and Literacy Environments and Early Literacy Trajectories of Low-Socioeconomic Status Chilean Children

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This study used Latent Class Analysis to identify groups of children exposed to similar Home Language and Literacy Environments (HLLE) and explored whether belonging to a given HLLE group was related to children's language and early literacy growth from prekindergarten to kindergarten. Participants were 1,425 Chilean mothers and their children (M_{age} = 52.52 months at baseline) from low-socioeconomic status households. Four HLLE groups were identified, which were associated with different trajectories of language and early literacy development. Children from groups whose mothers either read and talk about past events with them or teach them letters in addition to reading and talking about past events, showed higher relative vocabulary and letter knowledge. Implications for research and interventions are discussed.

Decades of research across diverse populations show that before starting primary school, children from low sociocultural and economic backgrounds perform significantly worse than their peers from more affluent contexts in oral language and code-related skills (Buckingham, Beaman, & Wheldall, 2014). These foundational skills predict the development of decoding and reading comprehension throughout primary and secondary school (Suggate, Schaughency, McAnally, & Reese, 2018).

In Chile—the country with the highest level of inequality among OECD countries (OECD, 2016)—the socioeconomic achievement gap is particularly critical. At 30–60 months of age, Chilean children from the most affluent families outperform their peers from the poorest families in receptive vocabulary by a standard deviation of .7, a gap that increases to .9 *SD* units when children are in 10th grade (Contreras & Puentes, 2017). This cumulative achievement gap has also been observed in international and national assessments, such as PISA (Programme for International Student Assessment) and SIMCE (the Chilean educational quality assessment system), which are also good predictors of college enrollment (Ferreira & Gignoux, 2014). Given that < 50% of Chilean children from the lowest income quartile aged 0–5 years attend any type of early childhood education (Ministerio de Desarrollo Social, 2017), studying the home environment is essential to understanding these early differences.

Logically, researchers and policymakers have persistently targeted families of low socioeconomic status (SES) with interventions to promote child language and literacy, yet their effectiveness remains limited (Duncan, Ludwig, & Magnuson, 2010). One possible reason is that interventions fail to target the groups most in need. From a bioecological perspective of human development (Bronfenbrenner & Morris, 2006), groups most in need are not solely defined by distal factors (e.g., low income or low parental education), but primarily by the scarcity of proximal processes (i.e., systematic interactions) that foster early language and literacy development. In line with this perspective, it

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becomes necessary to capture groups with common patterns of proximal processes *within* the low-SES population. If the identified groups show different developmental trajectories in early language and literacy, we would be faced with compelling evidence of the existence of specific needs for specific groups of low-income families. Such evidence could be key in refining the—thus far unsuccessful—one-size-fits-all approach to family interventions oriented to the development of children's early language and literacy.

Different conceptual approaches have contributed to our current understanding of proximal processes associated with child language and early literacy development. From the Home Literacy Environment (HLE) construct, processes labeled *active*, referring to situations in which parents directly engage children in literacy-related experiences, have been more associated with early language and literacy development in preschool years than *passive* processes, in which parents indirectly influence these skills by offering models of literacy engagement through their own reading habits (Burgess, Hecht, & Lonigan, 2002). Within active processes, proponents of the HLE model differentiate between *informal* and *formal* activities—which both hold unique contributions to child development. Since informal activities focus predominantly on the meaning of texts—such as book reading—they are often associated with language development, whereas formal, code-oriented activities—such as teaching reading or writing letters—relate to children's code-related skills (Sénéchal & Lefevre, 2002, 2014). Beyond parental activities, a *broad* view on the HLE model suggests that child interest in literacy is also a factor that enriches home literacy practices and therefore contributes to child literacy development (Martini & Sénéchal, 2012). Finally, outside the boundaries of the HLE model, children's participation in conversations that refer to content beyond the here-and-now also contributes to the development of children's language and literacy skills (Tabors, Roach, & Snow, 2001).

In spite of the rich body of knowledge on proximal processes associated with child language and early literacy skills, our understanding of their impact on development is still scattered due to methodological limitations. Whereas conceptually, the dominant conceptual approaches described earlier tend to conceive child language and literacy development as a product of complex, co-occurring processes, the dominant methodological approaches tend to disregard this complexity. Much of the evidence in the field is based on studies that explore the unique contributions of specific home literacy processes to child outcomes, thereby dissecting the HLE into its individual components. Such scrutiny of the predictive power of individual processes is representative of the so-called *variable-oriented* approach. As a result of this dominant approach, we know more about the unique contributions of specific processes to language and literacy development than about the *environments* that promote these outcomes. As opposed to a set of variables, environments correspond to patterns of co-occurring processes experienced by the developing child (Bronfenbrenner & Morris, 2006), which are best captured by a *person-oriented* approach. Understanding those patterns is relevant because specific processes do not occur in isolation, as "people move through (⋯) environments, not variables" (Bråten & Olaussen, 2005, p. 360). Moreover, variable-oriented approaches hold the debatable assumption that "the population is homogeneous with respect to how the predictors operate on the outcomes" (Laursen & Hoff, 2006, p. 379).

Therefore, in this study we use the construct Home Language and Literacy Environment (HLLE; Duursma et al., 2007; Scheele, Leseman, Mayo, & Elbers, 2012), which captures a series of home-situated processes and characteristics that have the potential to favor oral language and early literacy in the preschool period. This construct includes not only formal and informal activities, but also child interest in reading and engagement in past event conversations at home. Our first aim in this work is to capture subgroups of children who experience similar HLLE patterns, allowing us to interpret our results at an individual (instead of variable) level (Bergman & Trost, 2006). The second aim is to explore whether those distinct HLLE patterns are predictive of diverse language and literacy development pathways. Identifying subgroups that share common HLLE patterns would increase the ecological validity of inferences regarding the association between HLLE dimensions and language and early literacy development.

HLLE Processes Linked to Language and Early Literacy Development

From the wide range of home-situated processes associated with child language and literacy development, our selection of processes to include in this study has been informed by several sources. We use the work by Burgess et al. (2002) to justify our emphasis on *active* processes. *Active* processes—which directly engage children in literacy-related situations (e.g., conversations, shared book reading,

teaching letters)—show more consistent associations with child language and early literacy development than *passive* processes, which operate indirectly by means of parental modeling (e.g., parent's reading habits) or alternative leisure activities (e.g., watching noneducational TV). Moreover, in line with the advocated shift from a narrow to a broad conceptualization of HLE (Martini & Sénéchal, 2012), we also include child interest in literacy (i.e., in reading or in letters) as one of the studied processes. Finally, and although it does not directly address a process, variation in availability of children's books at home has been well-documented, both among socioeconomically diverse (Susperreguy, Strasser, Lissi, & Mendive, 2007; Bradley, Corwyn, Mcadoo, & Coll, 2001) and within low-income samples (Raikes et al., 2006). For this reason, we consider the availability of children's books at home to proxy the child's exposure to and interaction with written material.

Frequency of Shared Reading

Shared reading corresponds to one of the most widely studied home literacy processes, which through parent self-report shows a consistent longitudinal relation to vocabulary development during toddlerhood (Raikes et al., 2006) and preschool years (Kim, 2009). Utilizing a measure of parents' familiarity with children's literature (i.e., Title Recognition Test), this association lasts from preschool through the elementary years (Sénéchal & Lefevre, 2002, 2014). Meta-analytic evidence has established a robust relation between shared reading frequency and vocabulary development across diverse SES (overall effect size $d = 0.67$; Bus, van IJzendoorn, & Pellegrini, 1995), and recently in a controlled study with low-income Brazilian families ($d = 0.33$; Weisleder et al., 2017). The relation between shared reading and child vocabulary development has also been attested within low-SES samples, by correlational studies in Chile (Mendive, Lissi, Bakeman, & Reyes, 2017; Coddington, Mistry, & Bailey, 2014) and the United States(Bracken & Fischel, 2008; Raikes et al., 2006, the latter focusing on Spanish-speaking families), and by longitudinal studies (Tabors et al., 2001).

Evidence of the relation between shared book reading and early literacy skills is less consistent. On the one hand, studies in Chile (Mendive et al., 2017; Strasser & Lissi, 2009) and in the United States—in low-SES (Tabors et al., 2001) and linguistically diverse (Sparks & Reese, 2013) samples—have found concurrent and longitudinal associations between shared reading and letter knowledge. Additionally, in their meta-analysis, Bus et al. (1995) reported a moderate association between shared reading and a literacy composite, which included letter knowledge, phonemic blending, and name writing or reading. However, a meta-analysis that excluded correlational studies yielded no evidence of such association (Sénéchal & Young, 2008), something that is consistent with other correlational (Baroody & Diamond, 2012) and longitudinal studies using French- or English-speaking samples that included middle-class participants (Sénéchal & LeFevre, 2002, 2014).

Teaching Letters

Parental support in letter identification and writing has shown consistent associations with child phonological awareness, letter recognition, and decoding skills in samples of diverse SES (Hood, Conlon, & Andrews, 2008; Sénéchal & LeFevre, 2002, 2014). A meta-analysis of interventions that trained parents to conduct literacy exercises with their children suggests there is a causal association between such practices and children's reading skills from kindergarten to Grade 3 (Sénéchal & Young, 2008). An exception to this consistent association comes from Kim's (2009) study in Korea, which found that, after controlling for home reading, there was a negative association between parent teaching and code-related skills. This finding suggests that associations between parent teaching practices and child literacy outcomes might be—at least partially—dependent on culture.

Reading Interest

There is evidence that child interest in letters is uniquely associated with alphabet knowledge and decoding skills in first grade, above and beyond parent teaching practices (Martini & Sénéchal, 2012). Similarly, children's interest in reading is associated with concepts about print and letter knowledge, after removing the influence of demographic factors (Baroody & Diamond, 2012; Bracken & Fischel, 2008; Sparks & Reese, 2013) and even after controlling for shared reading and other book-related activities at home (Frijters, Barron, & Brunello, 2000). A notion of HLLE that jointly addresses parental activities and child interest underscores the plausible transactional relation between the two. Parents might adjust the intensity of activities in response to child interest, and vice versa.

Talking About Past Events

One relevant and widespread form of oral discourse corresponds to *narratives* of personal past events (Uccelli, Hemphill, Pan, & Snow, 2006). Conversations about past events tend to progressively appear during a child's second year (Peterson, Jesso, & Mccabe, 1999), and based on the documented use of stories with morals or advice for life and/or stories from their own lives and families, talking about past events could be considered a trait of the Hispanic socialization culture (Valdes, 1996). It is possible that talking about past events is an even more prevalent activity than shared reading among Latin American families. Supporting this assertion is the finding that immigrant Hispanic parents read to their children significantly less than European-American parents in a large study in the United States (Bradley et al., 2001).

Longitudinal evidence shows that child exposure to conversations about past or future events at 42 months of age predicts further vocabulary knowledge at 54 months of age (Rowe, 2012); a similar association was found between this type of exposure when a child is 5 years old, and child vocabulary up until the sixth grade of primary school (Snow & Beals, 2007). Even more eloquent is the positive impact on child vocabulary reported by an intervention that trained mothers in sustaining conversations about past events with their children (Peterson et al., 1999). The rationale behind these effects is that talking about nonpresent events requires the child to understand and produce longer and more complex sentences—with greater word diversity and sophistication in order to communicate chronological and logical sequences—than is required for talk addressing events in the here-and-now, which tends to include a higher proportion of deictic expressions (Snow, 1983). Finally, inconsistent results have been documented of the relation between the parent's reminiscing style when talking about shared past events and code-related skills. On the one hand, in a subsample of this study, children whose parents show styles that allow the child to narrate, show higher gains in letter knowledge and early writing 6 months later, compared to children whose parents used a didactic style (i.e., parent acting as narrator and the child as audience; Leyva & Smith, 2016). Oppositely, the reminiscing style of low-income Costa Rican parents was not concurrently associated with letter knowledge (Carmiol, Sparks, & Conejo-Bolaños, 2017).

Availability of Children's Books at Home

In contrast to the processes previously reviewed, the availability of books at home corresponds more to a structural feature of the HLLE rather than to a process. The availability of children's books at home can be understood as a proxy for children's active engagement with written discourse. A literature review shows evidence of an association between the availability of children's books and child vocabulary development (Scarborough & Dobrich, 1994), an association that has also been observed within a low-SES sample (Payne, Whitehurst, & Angell, 1994). Additionally, as a structural feature that proxies child engagement with texts, the availability of books at home has also been used in surveys as part of a composite of indicators that characterize HLLE. Examples of this are the HOME inventory in the United States. (used, e.g., by Bradley et al., 2001) and the Chilean Longitudinal Early Childhood Survey (ELPI, used by Coddington et al., 2014).

Previous Description of HLLE Groups

Research conducted using diverse approaches has aimed to identify groups that share common HLLE patterns, examine their relation to other variables, and understand their influence on children's early literacy development. The seminal ethnographic study by Heath (1982) reports such differences between SES groups. Heath eloquently showed that patterns of family practices are linked to cultural patterns of oral language and written discourse usage. From a very early age, children in households from middle-class, school-oriented communities are familiar with the use of books, discussing the information they convey, and recognizing them as recreational objects. The usage of books in white households in a mill community is different, Heath found, in that conversations around books emphasize letter and number identification, and labeling images, where children play a more passive role. Similarly, African American families in mill communities of recent rural origin also show a distinctive pattern, in which children tend not to be involved in conversations until they learn to talk, and shared book reading is not a common practice.

More recent studies have used person-oriented approaches with quantitative techniques that allow for the generalization of HLLE patterns to wider populations. In this tradition, Phillips and Lonigan (2009), by analyzing 12 items, found three clusters

among 1,044 U.S. families: *high-high*, with a high level of implementation of activities related to both book-related variables (interest in reading, child's age at first shared reading experience, number of books owned, the frequency at which the child observes others in the household reading, and shared reading activities) and code-instruction activities (teaching letters and words, and playing alphabet games; $n = 344$); the opposite, *low–low*, with a low frequency of the same activities ($n = 357$); and the last, *low–high*, with low book-related activities but high frequency of activities involving attention to letters and words ($n = 343$). The *low-high* group contained families with the lowest income and parental education levels. However, Phillips and Lonigan found that families with the highest income and parental education levels tended to fall into the *high–high* group. This suggests that an emphasis on letter identification and word-decoding might not be exclusive to the low-SES families, but rather a strategy that more affluent families also use in combination with book-related activities.

Van Steensel (2006) found a similar pattern, by analyzing the frequency of four types of activities (13 activities grouped into four through factor analysis) in a socioeconomically and culturally diverse sample of Dutch families ($N = 116$). He identified three HLE clusters. Two of these groups were distinguished by the intensity of their practices. On the one hand, the *rich* HLE group ($n = 30$)—primarily parents with high levels of schooling—displayed the highest frequency of literacy activities, for both adults (e.g., reading for work or for pleasure) and children (shared reading, library visits, singing rhymes or songs, and writing practice). On the other hand, the group labeled *poor* HLE—the least prevalent group ($n = 22$), which was mainly comprised of parents with low levels of schooling—showed the lowest frequency for both types of activities. Finally, the author identified a group whose home literacy practices prioritized child-directed HLE activities (therefore labeled *child-directed*). This group—which included parents from all types of educational backgrounds—was the most prevalent ($n = 47$) and reflected a lower frequency of adult literacy activities, but a high frequency of activities involving the child.

To the best of our knowledge, the only study that took a person-oriented approach to exploring HLE differences within low-SES groups is by Davis et al. (2015). Their analysis, based on 11 items, yielded three HLE groups in a sample of Latino immigrant families with English-learning children living in the United States ($N = 193$). The *high beliefs and practices* group was the most prevalent (47%), comprised of families with the highest relative levels of parental education, who reported shared reading five or more times a week and having more than ten books at home. On the other end of the spectrum, the *low beliefs and practices* group—the second most prevalent (37%), with the lowest relative parental education level—reported reading two or fewer times per week and had ten or fewer books available at home. Although Davis et al.'s study addressed HLE among a Latino, Spanish-speaking sample, the specific challenges Latino families face raising bilingual children in the United States may limit the generalizability of the results to the Chilean context. In Chile, the vast majority of preschool children (and all children in our sample) learn Spanish as their first—and only—language.

Only van Steensel's (2006) study revealed interesting insights regarding the predictive validity of the HLE groups identified. In this study, children in the *rich* group exhibited concurrently more vocabulary in kindergarten than the *child-directed* and *poor* HLE groups. In first grade, the *rich* and *child-directed* groups scored higher on reading comprehension compared to the *poor* HLE group; however, in second grade only the difference between the *rich* and the *poor* HLE groups remained significant.

Taken together, the state of knowledge about person-centered patterns of HLLE is still limited. First, studies to date have only included selected languages, restricting our understanding of links between HLLE and language and literacy development in children growing up in a Spanish-dominant culture. This is an important omission given the fact that Spanish is the second most spoken language in the world after Chinese. Second, studies predicting child developmental outcomes based on HLLE group have failed to account for how group membership might influence the growth rate of those outcomes. This is important because a HLLE pattern might not explain skill differences at a specific point in time, but it could explain different trajectories; thus, by exploring growth, we will expand knowledge of the role of HLLE patterns on skill development in children.

Poverty and Literacy Practices in the Chilean Context

In 2011, Chile was considered an upper-middle-income economy (World Bank, 2018). However, considering that Chile has the highest inequality indices among Latin-American (CEPAL, 2012) and OECD countries (OECD, 2016), this label is unrepresentative for this population. Thus, in the same year the

country showed a poverty rate of 14%—defined as income below 149 USD a month (Ministerio de Desarrollo Social, 2011). High poverty and inequality rates are associated with low availability and quality of print material conducive to reading, such as books, but also signs, labels, and logos in public spaces (Neuman & Celano, 2001). In addition, Chile has one of the highest tax rates on books in the world (19%), making books inaccessible for many middle- and low-income families. These factors might help explain why reading books is not a common practice in Chile, particularly in low-SES families. A recent nationwide survey revealed that 70% of low-SES adults—and 48% of adults in general—did not read a single book for leisure in the last year (Consejo Nacional de la Cultura y las Artes, 2014). Moreover, the practice of shared book reading is overall infrequent—only 54% of parents report reading books to their children, which is lower than the percentage for low-SES families in the United States (Susperreguy et al., 2007)—and positively associated with parental educational level.

The Current Study

The research questions that guided this study were as follows: (a) Which groups of HLLE processes are found in a Chilean low-SES sample at the beginning of prekindergarten? and, (b) How does HLLE group membership differentially predict language and early literacy growth, controlling for sociodemographic factors and assignment to Un Buen Comienzo (UBC) intervention? Based on previous studies, we expected to identify at least two HLLE groups characterized by low and high frequency of HLLE practices. In line with evidence showing that teaching letters is more frequent in low-SES households (Susperreguy et al., 2007; Lynch, Anderson, Anderson, & Shapiro, 2006; Stipek, Milburn, Clements, & Daniels, 1992), we expected to find a third group of families emphasizing these practices. We also expected that group membership would be related to early language and literacy growth, but given the scarcity of similar previous studies and the inconsistency of their findings (Hindman, Skibbe, Miller, & Zimmerman, 2010; Kim, 2009), we took an explorative approach to this question.

Method

Participants

Data for this study were drawn from a staggered randomized controlled trial (RCT) from UBC (A Good Start in English), a 2-year professional development program for preschool teachers (Moreno et al., 2011). The children participating in the RCT were recruited from 64 public schools located in six low-income municipalities in Santiago, Chile. Municipalities were invited to participate in the program if at least 20% of their students were at-risk (i.e., identified through a government measure for all households, which included family income, parent education, and whether the family was a beneficiary of government social/health benefits). Through a staggered design, children were aggregated into three subsamples, with each participating over a 2-year period, as follows: Subsample 1 (one municipality from 2008 to 2009), Subsample 2 (two municipalities from 2009 to 2010), and Subsample 3 (three municipalities from 2010 to 2011). For each subsample the evaluation assessed children and parents at the beginning of prekindergarten (baseline), with posttests taking place at the end of prekindergarten and again at the end of kindergarten (see Yoshikawa et al., 2015, for details of the intervention, impact results and sample selection).

From the full impact study baseline sample (N = 1,876), we excluded children who had repeated a grade (n = 5) and those whose home literacy practices questionnaire was answered by someone other than the mother (fathers = 125; others = 189; and missing = 132). Grade repetition during preschool is particularly uncommon in Chile, and removing these children made it possible to follow the other children through their kindergarten year. Moreover, we only included questionnaires filled out by mothers to support the ecological validity of our inferences, as empirical data have shown that mothers are consistently the most frequent caregiver for Chilean children. In fact, one large-scale intervention with Chilean families (N = 3,597) focused on the lowest quintile (52%) across regions reported that approximately 90% of children aged 25–72 months had mothers as their main caregiver (World Bank, 2012). The final analytical sample had 1,425 mother–child pairs.

Independent sample t-tests revealed no statistically significant differences in children's early literacy skills at the end of prekindergarten for the full sample versus the selected sample. Similarly, chi-squared tests revealed no association between the full versus selected sample and mother's education, child controls, nor most of the items used to describe HLLE, with the exception of helping the child to read and writing letters and numbers, with $\chi^2(1) = 6.81$, $p = .009$ and $\chi^2(1) = 7.5$, $p = .006$,

respectively. For both items, the likelihood that the activity was being carried out three or more times a week (high frequency) was higher in the subset than in the larger sample.

Table 1 reports characteristics of our analyzed sample and compares its distribution by the three subsamples. Overall, there is a similar distribution in the total sample, compared with the subsamples. Additionally, our analyzed sample resembles characteristics of the low socioeconomic population in Chile (see details on Appendix S1).

Data Collection Procedures

Data for this study came from self-report questionnaires given to the parents and child language and literacy assessments, collected at both the baseline time (beginning of prekindergarten) and during two posttests (end of prekindergarten and end of kindergarten, respectively). In Chile, the school year starts in March and ends in December. Thus, baseline data were collected between March and May (starting two weeks into the school year), resulting in high variability of children's age at this point in time (see Table 2). Posttests were administered between October and December. Parental consent forms and questionnaires were collected at the time of the pretest at the schools, either in small-group meetings or during home visits conducted by the assessment team. Trained research assistants administered the questionnaires and read through the questions upon request from parents who had low literacy levels. For parents with reduced literacy or writing abilities, the research assistants wrote the answers for them. Questionnaire administration took 75 min on average.

Child assessments were conducted at the schools during one or two individual 30- to 50-min "pull-out" sessions. Trained assessors spent time in the classroom and built rapport with the children during the individual assessment sessions. Details about training, assessors, and reliability procedures are reported in Yoshikawa et al. (2015).

Measures and Variables

HLLE (From Parent Questionnaire)

Eight items derived from an existing questionnaire (Romero-Contreras, 2006) were used: (a) *How often child looks at or reads books/magazines on his or her own*; (b) *How often child asks to be read to*; (c) *How often child asks to read to you*; (d) *Frequency of shared reading at home*; (e) *Number of children's books*; (f) *How often you help your child write letters and numbers*; (g) *How often you help your child read letters and numbers*; (h) *Frequency of talk about special past events* (see the list of fully worded items in Spanish and English in Appendix S2). With the exception of Item 5, responses were collected on a 4-point Likert scale (1 = *never or almost never*; 2 = *once or twice a month*; 3 = *once or twice a week*; 4 = *three or more times a week*). For the sake of parsimony and interpretability of the home language and literacy patterns found for all subgroups (from Latent Class Analysis [LCA]; see Analytical Strategy section),

Table 1
Characteristics of the Total Analyzed Sample and Distributions by Subsample

	Subsample 1 (n = 222)	Subsample 2 (n = 643)	Subsample 3 (n = 560)	Total (n = 1,425)
% Male	48	48	46	47
Average age in months (*SD*)	53 (3.38)	53 (3.74)	52 (3.66)	53 (3.68)
Prior school experience %	54	48	48	49
Family composition				
No father or mother	1%	6%	3%	4%
Just one parent	30%	54%	44%	46%
Both parents	69%	39%	53%	49%
Missing	0%	1%	0%	1%
Mother's education				
Incomplete elementary	10%	16%	13%	14%
Complete elementary	38%	41%	34%	38%
Incomplete high school	20%	17%	26%	21%
Complete high school	20%	13%	15%	15%
Some higher education	12%	11%	11%	11%
Missing	0%	2%	1%	1%
Number of children at home	2.51	2.80	2.63	2.69

Table 2
Means (Standard Deviations), Range, Percentage of Missing, and Correlations of Child-level Variables Included in Growth Model Analyses (n = *1,425)*

		M (*SD*)	Min–max	% missing	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1.	Months at baseline	52.52 (3.68)	40.28–67.71	0.14	—														
2.	Male	0.47 (0.50)	0.00–1.00	0	.04	—													
3.	Intervention	0.55 (0.50)	0.00–1.00	0	.03	.01	—												
4.	M Incomplete elem	0.11 (0.32)	0.00–1.00	0	−.01	.00	−.02	—											
5.	M Complete elem	0.15 (0.36)	0.00–1.00	0	.02	.03	.01	−.15***	—										
6.	M Incomplete HS	0.21 (0.41)	0.00–1.00	0	−.05	.00	.01	−.19***	−.22***	—									
7.	M Some higher	0.14 (0.34)	0.00–1.00	0	−.01	−.00	.01	−.14***	−.17***	−.21***	—								
8.	Books and talk	0.12 (0.32)	0.00–1.00	0	−.04	−.06*	.05	−.03	−.01	−.01	.02	—							
9.	High–all	0.24 (0.43)	0.00–1.00	0	.01	−.07**	.01	−.07*	−.00	−.03	.14***	−.20***	—						
10.	Literacy teaching	0.32 (0.47)	0.00–1.00	0	.04	.04	−.04	−.02	.01	.03	−.05	−.25***	−.39***	—					
11.	Vocabulary T1	18.32 (4.54)	0.00–34.00	8.63	.30***	−.06*	.02	−.17***	−.03	−.11***	.13***	.02	.13***	−.01	—				
12.	Vocabulary T2	21.91 (4.95)	0.00–37.00	7.72	.25***	−.03	.01	−.14***	−.04	−.07*	.11***	.01	.13***	−.02	.73***	—			
13.	Vocabulary T3	26.79 (5.08)	9.00–40.00	17.75	.20***	−.01	−.01	−.17***	−.05	−.09**	.12***	.01	.10***	−.01	.70***	.73***	—		
14.	Letter-word id T1	5.56 (2.43)	0.00–17.00	9.68	.21***	.04	−.04	−.09***	−.10***	−.06*	.09**	−.04	.12***	.04	.45***	.35***	.35***	—	
15.	Letter-word id T2	8.16 (3.47)	0.00–37.00	11.23	.16***	.03	−.03	−.10***	−.08**	−.10***	.11***	.00	.12***	.02	.40***	.42***	.40***	.46***	—
16.	Letter-word id T3	12.83 (6.53)	1.00–52.00	21.47	.06*	−.01	.05	−.14***	−.10***	−.07*	.11***	.02	.11***	−.01	.33***	.33***	.38***	.32***	.55***

Note. M = mother; Elem = elementary; HS = High school; Some higher = some higher education; T1 = wave 1; T2 = wave 2; T3 = wave 3.
*$p < 0.05$. **$p < 0.01$. ***$p < 0.001$.

responses were dichotomized into meaningful categories (1 = *three or more times a week,* and 0 = *less than three times a week*) to distinguish daily from infrequent use of these practices. We based our cutoff decision on the Dialogic Reading intervention, which trains the adult on strategies to encourage the child to actively participate in shared reading. This intervention was effective in incrementing child language by requesting that parents read with their children three to four times a week (Whitehurst et al.&&, 1988). The number of children's books at home (Item 5) was reported by parents through a discrete number. The number was dichotomized for analysis into 1 = *10 or more books* and 0 = *less than 10 books*, as in the HOME inventory (Bradley et al., 2001). See Appendix S3 for distributions before and after dichotomizing the HLLE items.

Control Variables

We included mother's education and child characteristics as control variables. The level of the mothers' schooling was measured in number of years and grouped into five categories that are meaningful to the Chilean context: 1 = incomplete elementary school; 2 = complete elementary school (8 years); 3 = incomplete high school; 4 = complete high school (12 years); and 5 = any higher education (13–17 years). Regarding child characteristics, mothers reported their children's date of birth—from which age (in months) at baseline was obtained—and child gender (0 = female, 1 = male), and we included a dummy variable to denote whether or not the child was assigned to take part in the *UBC* intervention.

Children's Outcomes

Children's language and early literacy skills were assessed using the Picture Vocabulary and Letter-Word Identification subtests from the Woodcock-Muñoz Language Survey, Revised Spanish Form (Woodcock, Muñoz-Sandoval, Ruef, & Alvarado, 2005). The Picture Vocabulary subtest measures receptive and expressive vocabulary and requires children to point to named pictures (scores range 0–58). The Letter-Word Identification subtest asks children to match pictures with words, name letters, and read words aloud from a list (score range 0–75). Past research has demonstrated high levels of internal reliability and validity for these two subtests (Schrank et al., 2005). Reliability coefficients ranged from .76 to .97, depending on children's age (Alvarado, Ruef, & Schrank, 2005). We used the raw scores on these subtests in all of the analyses. Table 2 summarizes descriptive statistics for mothers' level of education, children's characteristics, and children's learning outcomes. Appendix S4 contains the same variables at the school level.

Analytical Strategy

To answer the first question, we used LCA to identify subjacent groups of families displaying specific patterns across the eight HLLE items. LCA was conducted in Mplus (7.4 version; Muthén & Muthén, Los Angeles, CA) in order to investigate whether the sample revealed unobserved subpopulations of children as far as their home language and literacy practices were concerned. This technique belongs to the family of finite mixture models and assumes that "the relationship among the categorical variables is 'explained' by an underlying categorical latent variable (latent class variable)" (Masyn, 2013, p. 556). The observed categorical variables are, in this case, the eight HLLE dichotomous indicators.

Latent Class Analysis models were fitted, from one class up to six classes, all of them with *mother's education* as a covariate. Following the conceptualization outlined in Bronfenbrenner and Morris (2006), we focused on capturing groups according to their patterns of proximal processes with the child (i.e., HLLE) over the influence of other more distal factors, such as mother's level of schooling (Buckingham et al., 2014). Knowing more about proximal processes has practical implications, because they can be modified more easily than, in this case, mother's education. In addition, we ran analyses that included the distal factors—maternal depression, single-parent status, and number of children in the family—as covariates. Those covariates showed nonsignificant associations with the classes and, therefore, we decided to remove them from the models for the purpose of parsimony. In all class solutions—including the final one—the best log-likelihood was replicated. The one-class model acts as a null model, providing a benchmark of minimum goodness-of-fit. Different indices of relative fit were used to compare the fitted models. The information criteria used included the Bayesian information criterion, the consistent Akaike's information criterion, and the approximate weight of evidence criterion, with the lowest number representing the most optimal fit (Table 3). To compare model-fit improvements over a series of nested models (i.e., k vs. $k - 1$), we used the likelihood

ratio test (LRT) and its bootstrapped version (BLRT), which test whether the current latent class model (e.g., three classes) is a significant improvement over the $k - 1$ model (e.g., two classes). Moreover, precision of classification was examined by means of the models' entropy values (range between 0 and 1, with higher values suggesting better separation between classes) and the average posterior class probabilities. Finally, and very importantly, interpretability of the class solutions and appraisal of class sizes were also relevant considerations in order to decide upon a solution that was substantively sound and useful to answer our research question. Once the final model was identified, we explored the bivariate residuals of the class indicators, following the recommendations by Asparouhov and Muthén (2015). This bivariate residuals among the class indicators exploration led us to relax the assumption of local independency when the relation among indicators was not adequately explained by the latent class solution (see details of these explorations on Appendix S5).

To tackle the second question, we fitted growth models for each dependent variable (i.e., vocabulary and letter-knowledge) with membership to HLLE group at the beginning of prekindergarten as a predictor, as well as with a series of control variables. To account for the nested structure of the data, we fitted three-level growth models. Time (Level-1) is nested within children (Level-2), who in turn are nested within schools (Level-3). In our growth models, *time* represents the number of months after the baseline measurement for each child (e.g., months at Time 3 minus months at baseline, called *baseline-centering* by Hoffman, 2015). We fitted linear growth models because only three measurement waves were available (Hoffman, 2015), allowing random intercepts and slopes in levels two and three. Growth analyses were conducted in STATA 12 (StataCorp, College Station, TX) using the maximum likelihood estimator.

For each dependent variable, we fitted two models: the unconditional growth model, which included time as the only predictor at Level-1; and the final model, which included all Level-2 and -3 predictors of intercept and linear slope. Level-2 variables included child's membership in a given HLLE group as a predictor (by three dummy variables), along with control variables. To create the HLLE membership, each child was assigned to the HLLE group they most likely belonged to as a result of the LCA. Child-level control variables included child gender (as male), months of age at baseline (centered at the grand-mean of age at Time 1 = 53 months; range 40.28–-67.71 months), mother's level of education (by four dummy variables), and intervention group (as assigned to UBC). We did not find association between intervention assignment and HLLE membership, $\chi^2(3) = 4.25$ $p = .236$. However, considering that on one hand there was some evidence that UBC was not effective in terms of the targeted child language, literacy, and socioemotional developmental domains (Yoshikawa et al., 2015), and on the other hand that the impact of the intervention on family practices has not yet been studied, we made a conservative decision to control for assignment of children to the UBC intervention.

The final model considers the following regression equations for Levels 1 and 2 (see Appendix S6):

Level-1 (time):

$$Y_{tij} = \pi_{0ij} + \pi_{1ij}\left(\text{Time} - \text{Baseline}_{tij}\right) + e_{tij}. \quad (1)$$

Intercept and slope at Level-2 (children[1]):

$$\begin{aligned}\pi_{sij} &= \beta_{s0j} \\ &+ \beta_{s1j}(\text{Maternal incomplete elementary education}_{ij}) \\ &+ \beta_{s2j}(\text{Maternal complete elementary education}_{ij}) \\ &+ \beta_{s3j}(\text{Maternal incomplete high school education}_{ij}) \\ &+ \beta_{s4j}(\text{Maternal some higher education}_{ij}) \\ &+ \beta_{s5j}(\text{Months at baseline} - 53_{ij}) \\ &+ \beta_{s6j}(\text{Male}_{ij}) + \beta_{s7j}(\text{Intervention group}_{ij}) \\ &+ \beta_{s8j}(\text{Books and talk}_{ij}) + \beta_{s9j}(\text{High} - \text{all}_{ij}) \\ &+ \beta_{s10j}(\text{Literacy teaching}_{ij}) + r_{sij}.\end{aligned} \quad (2)$$

Following Hoffman (2015), we included Level 3 as school-level averages for all child-level variables, centered around the school-level mean, to prevent conflating the variance of child-level variables with variance due to their nesting within schools. Thus, we specifically included both HLLE (representing the percentage of children belonging to each HLLE group in the school) and control variables at the school level.

Thus, the final model considers the following regression equations at level three:

Subscript "*s*" is used to indicate that the model was estimated for both the intercept (π_{0ij}/β_{00j}) and the slope (π_{1ij}/β_{10j}) at levels two and three.

Table 3
Fit Indices and Class Sizes for Latent Class Analysis Models

Classes	LL	*n* par	BIC	CAIC	AWE	Entropy	BLRT $k-1$ (p)	LRT $k-1$ (p)	Class size (%)					
1	−9,827.568	10	19,727.76	19,750.16	19,855.19	1	—	—	1					
2	−6,843.067	18	13,816.65	13,857.19	14,046.24	0.707	< .0001	< .0001	49	51				
3	−6,628.557	28	13,460.13	13,523.19	13,817.28	0.792	< .0001	< .0001	39	31	29			
4	−6,522.736	38	13,321.00	13,406.58	13,805.69	0.788	< .0001	< .0001	24	36	13	27		
5	−6,498.407	48	13,344.84	13,452.95	13,957.09	0.779	< .0001	.051	24	05	37	11	22	
6	−6,475.114	58	13,370.77	13,501.40	14,110.56	0.758	< .0001	.175	13	28	12	21	20	06
4-LocDep	**−6,488.891**	**40**	**13,267.81**	**13,357.90**	**13,778.01**	**0.776**	**< .0001**	**< .0001**	**31**	**12**	**24**	**33**		

Note. Boldface font indicates selected model. LL = log-likelihood; *n* par = number of estimated parameters; BIC = Bayesian information criterion; CAIC = consistent Akaike's information criterion; AWE = approximate weight of evidence criterion; LRT = likelihood ratio test; BLRT = bootstrapped likelihood ratio test. LocDep = local dependencies, which means that the assumption of local independency has been relaxed, by including class-invariant direct *effects between number of children's books at home* and *talking about a special past event*, and between *child looks at or reads books on his or her own* and *child asks to read to adult*.

Intercept and slope at Level-3 (schools[1]):

$$\begin{aligned}\beta_{s0j} &= \Upsilon_{s00} \\ &+ \Upsilon_{s01}(\text{SM Maternal incomplete elementary education}_j - 0.13\%) \\ &+ \Upsilon_{s02}(\text{SM Maternal complete elementary education}_j - 0.16\%) \\ &+ \Upsilon_{s03}(\text{SM Maternal incomplete high school education}_j - 0.22\%) \\ &+ \Upsilon_{s04}(\text{SM Maternal some higher education}_j - 0.12\%) \\ &+ \Upsilon_{s05}(\text{SM Child months at baseline}_j - 0.52\%) \\ &+ \Upsilon_{s06}(\text{SM Percentage of Male}_j - 0.48\%) \\ &+ \Upsilon_{s07}(\text{SM Percentage of children in Intervention group}_j - 0.51\%) \\ &+ \Upsilon_{s08}(\text{SM Books and talk}_j - 0.13\%) \\ &+ \Upsilon_{s09}(\text{SM High} - \text{all}_j - 0.25\%) \\ &+ \Upsilon_{s10}(\text{SM Literacy teaching}_j - 0.32\%) + u_{s0j}. \end{aligned} \quad (3)$$

For example, the parameter of the high-all HLLE group at Level 2 (Table 4) represents the change in the intercept (or slope) associated with the child's membership to this HLLE group. Conversely, the parameter of the high-all HLLE group at Level 3 (SM percentage of HLLE High-all; see Table 4) represents the intercept or slope change associated with each additional percentage of classmates belonging to the high-all HLLE group above the school mean (> 25%).

Regarding missingness, the percentage of missing data approximated 1% for all HLLE items, except for the 11% on frequency of shared reading. We used the full-information maximum likelihood estimator for LCA analysis (see Appendix S3 for percentage of missing for each item). For growth models, the percentage of missing data on vocabulary and letter-word identification approximated 10% between Times 1 and 2, and 18% on Time 3 (see Table 2 for missing data on Levels 1 and 2 variables, and Appendix S4 for Level 3). We used likelihood-based estimations in growth models, which assume that the data are missing at random and use complete cases (i.e., Level-1 observations; Hoffman, 2015). Control variables included in the analyses worked as auxiliary variables that helped to reduce bias in our estimations, and—due to their relation to missingness explained below—made the missing-at-random assumption more reasonable (Enders, 2010). Particularly, we found a higher proportion of missing in both the treatment group ($\Delta\chi^2(1) = 5.70$, $p = .02$) and males in letter-word identification at Time 3 ($\Delta\chi^2(1) = 5.70$, $p = .017$). Using likelihood-based estimations, the models were based on $n = 1{,}416$ and 1,411 individuals in vocabulary and letter-word identification, respectively.

Results

HLLE Groups

Fit information for latent class models and class sizes are reported in Table 3. Average probability for the most likely class is reported in Appendix S5. Both the BLRT and LRT (Table 3) suggest that the four-class model is a significantly better solution than the three-class model ($p < .001$). When five and six classes were added, the models were rejected by the LRT, indicating that they do not significantly improve the previous models. Besides the statistical support, the four-class model offered the best interpretability and was thus considered the best class solution. See Table 3 under the name "4 classes –LocDep" and a related note, as our final model used to classify the participants and continue with further analysis.

Table 4
Fixed Effects of Final Growth Models of Vocabulary and Letter Word-ID

	Vocabulary[a]	Letter Word-ID[b]
Intercept	19.37 (0.57)***	5.73 (0.32)***
Male	−0.39 (0.23)	0.21 (0.13)
Intervention (0 = control group)	−1.13 (0.98)	−0.69 (0.56)
Mother education: incomplete elementary[c]	−2.18 (0.39)***	−0.63 (0.22)**
Mother education: complete elementary[c]	−0.88 (0.35)*	−0.67 (0.19)***
Mother education: incomplete high school[c]	−0.97 (0.31)**	−0.43 (0.17)*
Mother education: some higher[c]	0.02 (0.36)	0.05 (0.20)
Months at baseline (0 = 53[d])	0.37 (0.03)***	0.13 (0.02)***
HLLE books and talk[e]	**0.81 (0.39)***	**0.16 (0.22)**
HLLE high-all[e]	**1.45 (0.31)*****	**0.79 (0.17)*****
HLLE literacy teaching[e]	**0.37 (0.28)**	**0.39 (0.16)***
School mean age in months at baseline (0 = 52 months)[f]	0.05 (0.12)	−0.01 (0.07)
School mean percentage of male (0 = 0.48%)[f]	0.51 (1.02)	−0.07 (0.56)
School mean percentage of children in intervention group (0 = 0.51%)[f]	1.33 (1.01)	0.45 (0.57)
School mean mother education (ME): incomplete elementary (0 = 0.13%)[c,f]	−0.30 (1.71)	0.02 (0.95)
School mean ME: complete elementary school (0 = 0.16%)[c,f]	1.16 (1.54)	0.40 (0.85)
School mean ME: incomplete high school (0 = .22%)[c,f]	−3.47 (1.54)*	−1.06 (0.85)
School mean ME: some higher education (0 = 0.12%)[c,f]	5.27 (1.86)**	1.05 (1.03)
School mean HLLE: books and talk (0 = 0.13%)[e]	**−0.41 (1.86)**	**−0.88 (1.03)**
School mean HLLE: high-all (0 = 0.25%)[e]	**0.32 (1.19)**	**0.17 (0.65)**
School mean HLLE: literacy teaching (0 = 0.32%)[e]	**2.31 (1.32)**	**1.77 (0.73)***
Time (or linear growth slope)	0.45 (0.03)***	0.44 (0.05)***
Time × Male	0.02 (0.01)	0.01 (0.02)
Time × Intervention (0 = control group)	−0.02 (0.05)	−0.08 (0.09)
Time × Mother Education: Incomplete Elementary[c]	−0.02 (0.02)	−0.12 (0.03)***
Time × Mother Education: Complete Elementary[c]	−0.01 (0.02)	−0.12 (0.03)***
Time × Mother Education: Incomplete High school[c]	−0.01 (0.02)	−0.09 (0.03)**
Time × Mother Education: Some Higher Education[c]	0.012 (0.02)	−0.04 (0.03)
Time × Months at Baseline (0 = 53[d])	−0.01 (0.00)***	0.00 (0.00)
Time × HLLE Books and Talk[e]	**−0.01 (0.02)**	**0.08 (0.03)***
Time × HLLE High-All[e]	**−0.01 (0.02)**	**0.08 (0.03)****
Time × HLLE Literacy Teaching[e]	**0.00 (0.01)**	**0.032 (0.02)**
Time × School Mean Age in Months at Baseline (0 = 52 months)[f]	0.01 (0.01)	0.01 (0.01)
Time × School Mean Percentage of Male (0 = 0.48%)[f]	−0.03 (0.06)	0.04 (0.11)
Time × School Mean Percentage of Children in Intervention Group (0 = 0.51%)[f]	−0.01 (0.06)	0.10 (0.09)
Time × School Mean ME: Incomplete Elementary (0 = 0.13%)[c,f]	−0.05 (0.10)	0.03 (0.18)
Time × School Mean ME: Complete Elementary School (0 = 0.16%)[c,f]	0.06 (0.09)	0.42 (0.16)**
Time × School Mean ME: Incomplete High School (0 = 0.22%)[c,f]	0.08 (0.10)	0.18 (0.16)
Time × School Mean ME: Some Higher Education (0 = 0.12%)[c,f]	0.14 (0.12)	0.82 (0.20)***
Time × School Mean HLLE: Books and Talk (0 = 0.13%)[e]	**0.25 (0.11)***	**−0.13 (0.19)**
Time × School Mean HLLE: High-All (0 = 0.25%)[e]	**0.06 (0.07)**	**−0.17 (0.12)**
Time × School Mean HLLE: Literacy Teaching (0 = 0.32%)[e]	**0.04 (0.08)**	**0.17 (0.14)**

Note. Boldface font indicates estimates for the HLLE predictor.
[a]Level-1 n = 3,785; Level-2 n = 1,416; Level-3 n = 64. [b]Level-1 n = 3,668; Level-2 n = 1,411; Level-3 n = 64. [c]Mother education reference category is "complete high school." [d]Centered variable (0 = mean). [e]Home Language and Literacy Environment (HLLE) reference category is "low-all." [f]All variables were centered at the mean school value (0 = school mean value). *p < .05. **p < .01. ***p < .001.

Understanding the HLLE Groups

The conditional item probabilities plot for the four-class (Loc-Dep) model is presented in Figure 1. We found four clear and distinguishable HLLE groups. In the group labeled *high-all*, accounting for 24% of the sample, households exhibited the highest probability of having more than 10 books and of implementing all the HLLE processes (i.e., shared reading, reading interest, teaching to write and read

letters, and talking about past events) three times a week or more. On the other end of the spectrum, 31% of the sample was labeled the *low-all* group, the least likely to have 10 books and to implement all the HLLE processes three times a week or more.

Interestingly, we found two more groups with strikingly different practice profiles. On the one hand, the *literacy teaching* group—the most prevalent in the sample (33%)—was characterized by mothers very prone to frequently (three times a week or more) engaging in activities that helped their children read and write letters. This group also contained the second-lowest probability (after the low-all group) of perceived child interest in reading, implementing shared reading, talking about past events, and having 10 or more books. Finally, the smallest group in the sample (12%), *books and talk*, contained participants with the second-highest probability (after the high-all group) of having 10 or more children's books, reading together three or more times a week, talking about past events, and perceiving their children as interested in reading. In contrast with the high-all HLLE group, the books and talk group was the second least likely (after the low-all group) to help their children read and write letters and numbers three or more times a week.

Predictive Validity of HLLE Groups

In line with our second research question, we explored to what extent the different HLLE groups predicted children's language and early literacy growth. To include HLLE as a Level-2 predictor, we created three dummy variables and set the low-all as the reference group. To create variables at Level-3, we included school-level averages for all child-level variables, centered around the school-level mean (SM parameters in Table 4).

Vocabulary. According to the final model (Table 4), the intercept was $b = 19.37$ ($p < .001$), indicating the initial vocabulary score for a child classed in the low-all reference group, after controlling for other variables (i.e., assigned to the control group, being female, 53 months old at baseline, whose mother has completed high school, and attending a school with an average percentage of the same variables). Additionally, if a child had come from a high-all HLLE group, the predicted vocabulary score would be 20.82 (increasing by 1.45 pts., $p < .001$, see Table 4), and it would be 20.18 (increasing by 0.81 pts., $p < .05$) if the HLLE was classified as books and talk. In practical terms, the differences at baseline with respect to the low-all group were moderate ($d_{\text{high-all}} = 0.63$) and small ($d_{\text{books\&talk}} = 0.44$), respectively.

In the case of a child classed in the low-all HLLE group, with similar control variable characteristics, the initial vocabulary score increases linearly by $b = 0.45$ points ($p < .001$) with every additional month (see Table 4).

The child-level HLLE did not predict variability in the growth rate at the child level (see parallel lines in Figure 2, letter A). However, such prediction did occur at the school level. For each additional percentage of classmates belonging to the books and talk HLLE group over 13%, the vocabulary growth rate of children at that school would be 0.7 with every additional month of age, after controlling for the child-level HLLE over time (resulting in an increase of 0.25 points $p < .05$ [see the Time × School Mean HLLE: Books and Talk parameter in Table 4] from the slope $b = 0.45$). This final model explains 43% of total vocabulary variance.

Letter-word identification. The intercept was $b = 5.73$ ($p < .001$), indicating the letter-word identification score for a child classified into the low-all HLLE group, after controlling for other variables (i.e., assigned to the control group, being female, 53 months old at baseline, whose mother has completed high school, and attending a school with an average percentage of the same variables). In addition, if a child of similar characteristics in control variables belonged to the high-all or literacy teaching HLLE groups, the initial score will be 6.52 (increasing by 0.79 pts., $p < .001$) and 6.12 (increasing by 0.39, $p < .05$), respectively (Figure 2, letter B). In practical terms, the differences at baseline with respect to the low-all group were large ($d_{\text{high-all}} = 0.94$) and medium ($d_{\text{literacy teaching}} = 0.54$), respectively.

Additionally, there was a significant effect of the percentage of children belonging to the literacy teaching HLLE group in schools ($b = 1.77$, $p < .05$), indicating that, after controlling for HLLE at the child level, for each additional percentage of classmates from a literacy teaching HLLE group over 32%, the letter-knowledge intercept for students of these schools increased by 1.77 points (see the School Mean HLLE: Literacy Teaching parameter in Table 4).

On another note, in the case of a child classed in the low-all HLLE group, the letter-word identification score increases lineally by $b = 0.44$ points ($p < .001$) for every additional month after baseline (Table 4). HLLE accounted for growth rate variability at the child level (but not at the school level). For every additional month, the growth rate for letter-word identification increased by 0.08 points more for

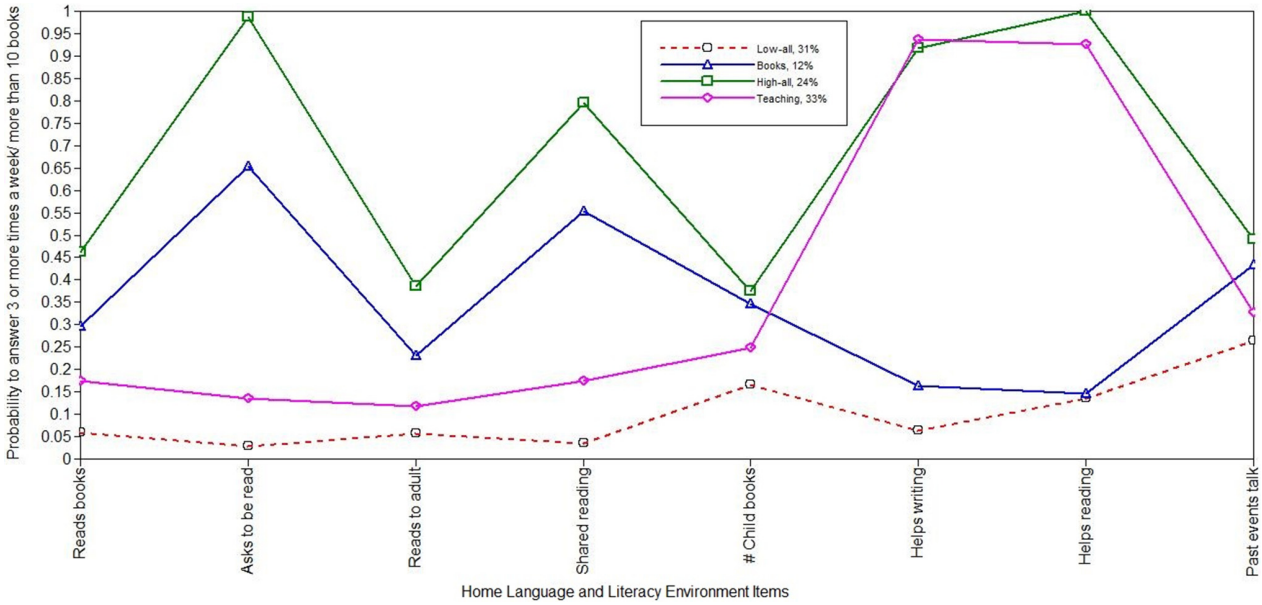

Figure 1. Conditional item probability profile plot for the four-class model.
Note. Class size information is presented in the legend. Books = books and talk group; Teaching = literacy teaching group. [Color figure can be viewed at wileyonlinelibrary.com]

children belonging to the books and talk group than the low-all group ($p < .05$). Similarly, the growth rate increased by 0.08 for every additional month, if the child belonged to the high-all group ($p < .01$, see Figure 2, letter B). The magnitude of the differences at 75 months (around the end of kindergarten) with respect to the low-all group was large ($d_{\text{books\&talk}} = 0.83$ and $d_{\text{high-all}} = 1.03$, respectively). Interestingly, the significant correlation between intercept and slope at the child level ($r = .4$; CI [.16, .59]; see Model 2 in Appendix S7) means that the growth rate in letter-word identification for children who had scores above the average at baseline was significantly higher than that of children whose scores at baseline were below average. Model 2 explains 39% of total letter knowledge variance.

Discussion

This study pursued two goals: (a) to identify subjacent subgroups across the multiple dimensions of HLLE in a sample of low-SES Spanish-speaking families in Chile, and (b) to understand to what extent HLLE patterns of these subgroups are associated with distinctive growth trajectories in children's language and early literacy skills, over the influence of sociodemographic factors. Through a rigorous statistical method, we found four groups of HLLE, which—to different extents—meaningfully explained variability in vocabulary and letter-knowledge trajectories.

On the one hand, we identified a *low-all* HLLE group, which reported the lowest probability of frequently displaying the home language and literacy processes included in this study (i.e., owning ten or more children's books, reading to their children, talking about past events, children showing interest in reading, and instruction for reading and writing letters regularly). Its prevalence (31% of our sample) resembles that of similar groups in previous studies (e.g., Davis et al., 2015; Phillips & Lonigan, 2009). On the other hand, the most prevalent group identified, *literacy teaching* (33%), emphasized instruction for reading and writing letters, which aligns with both the home literacy practices described by Heath (1982) in white mill community families and reports that low-SES families tend to emphasize literacy-teaching practices (Lynch et al., 2006; Stipek et al., 1992), a finding also previously observed in Chilean families (Susperreguy et al., 2007).

However, our choice for conceptually and methodologically focusing on environments allowed us to go beyond the confirmation of previous findings and to add more nuances to the possible range of home language and literacy practices within Spanish-speaking low-SES families living in Chile. Our explorations revealed the existence of two other

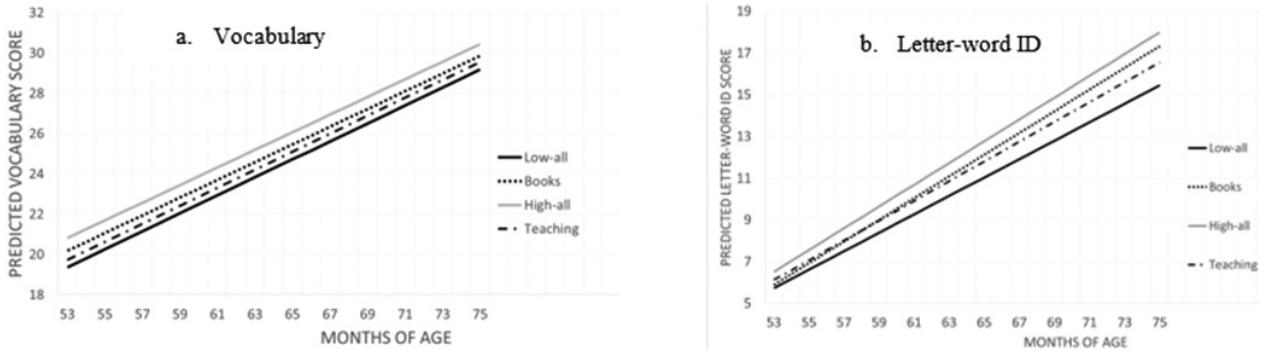

Figure 2. Fitted vocabulary and letter-knowledge trajectories by Home Language and Literacy Environment groups.

subgroups who report a set of language and literacy processes and materials that are typically associated with more affluent homes (Buckingham et al., 2014). In fact, about one quarter of our sample (24%) was the most likely to display all of the home language and literacy processes studied here on a regular basis and was thus labeled the *high-all* HLLE. This percentage is considerably lower than it was for both the 33% making up the *high-high* group in a diverse SES sample (Phillips & Lonigan, 2009), and the *high beliefs and practices* group (47%) in a sample of low-SES Latino immigrant families in the United States. (Davis et al., 2015). A fourth group, the least prevalent in our sample (12%), was labeled *books and talk,* which showed the second-highest probability of owning ten or more children's books, reading to their children, talking about past events, and children showing interest in reading regularly. In contrast, mothers in this group show very low probability of teaching their children to write or read letters.

In addition, membership in some HLLE groups was meaningfully associated with different trajectories of vocabulary and letter knowledge, even after controlling for mother's education, assignment to UBC intervention, and child characteristics. A pattern in our findings is that children from the high-all group, followed by the ones from the books and talk HLLE group, showed the strongest advantage at baseline in vocabulary, as depicted by the significant terms predicting the intercept for both groups (.7 and .4 *SD*s compared to the low-all HLLE group, respectively), and they maintained these differences throughout prekindergarten and kindergarten, as depicted by the nonsignificant terms for all HLLE groups predicting the slope, when compared with children from the low-all HLLE group. This pattern is consistent with findings from studies exploring the role of shared book reading and availability of children's books at home (Burgess et al., 2002; Payne et al., 1994; Sénéchal & LeFevre, 2002, 2014). In addition, this finding is also consistent with insights from research exploring the role of talk about past and future events in children between 42 and 54 months of age (Rowe, 2012). The vocabulary difference between the high- versus low-all groups matches the one reported for Chilean children from high- versus low-SES households within the same age range (Contreras & Puentes, 2017), which highlights the influential role of the HLLE even in a sample of similar SES levels.

Something unique to the books and talk group—as opposed to the low-all group— is that schools having more children from the books and talk group—that is, above the school-level average—show children with a faster vocabulary growth rate. We interpret this finding as an expression of the Matthew effect (Stanovich, 1986). A classroom with a high concentration of children experiencing book-related activities, child interest in reading, and talking about past events at home would be more responsive to language instruction than classrooms of children without such interest and exposure at home. This would encourage teachers to either read more frequently or in a more enjoyable way, or engage children in more decontextualized talk, which would translate into a detectable, faster school-level vocabulary growth rate.

Regarding letter knowledge, the faster growth in children belonging to books and talk (as depicted by its significant slope), compared to the low-all group, translated to a large difference of .83 *SD*s at around 6 years (75 months). Previous studies have reported the separate contributions of interest in reading (Baroody & Diamond, 2012; Bracken & Fischel, 2008; Frijters et al., 2000; Sparks & Reese, 2013), shared book reading and availability of children's books (Mendive et al., 2017; Sparks & Reese,

2013; Strasser & Lissi, 2009; Tabors et al., 2001), and a parental elicitor or constructor reminiscing style (Leyva & Smith, 2016) on letter knowledge. Our results add to the literature by establishing that an *environment* that combines frequent reading and conversational practices that fits with child interests, offers an encouraging climate for letter-knowledge learning. Interestingly, the accelerated letter-knowledge growth in the books and talk HLLE group occurs even though at baseline children from this group did not differ in letter knowledge from children in the low-all group, as was the case with the literacy teaching group.

Because a direct association has systematically been found between teaching letter sounds and shapes and letter knowledge (National Early Literacy Panel, 2008), it is surprising that the accelerated letter-knowledge growth found for the books and talk HLLE group occurs even though mothers from this group exhibited little emphasis on giving their children explicit instruction in reading or writing letters. However, the comprehensive model of early literacy offers a perspective for understanding this result. This model claims that diverse skills, grouped into oral language and print-related domains, emerge and mutually reinforce each other during the preschool years, which is supported by findings that vocabulary predicts code-related skills (Storch & Whitehurst, 2002) to the same extent as phonological sensitivity (Dickinson, McCabe, Anastasopoulos, Peisner-Feinberg, & Poe, 2003). Based on the predictive relation found between the books and talk HLLE group and children's vocabulary at the beginning of prekindergarten (i.e., the intercept), we suggest that by emphasizing book exposure and past event conversations, this environment influences children's vocabulary to reach a certain threshold capable of influencing letter-knowledge growth between prekindergarten and kindergarten. Conversely, and in accord with the view that vocabulary is more difficult to teach than sounds and shapes of letters (Dickinson, Golinkoff, & Hirsh-Pasek, 2010), home emphasis on fostering only letter sound and shape recognition, as the literacy teaching HLLE group exhibited, would not be enough to leverage vocabulary, thereby suppressing the influence that it would theoretically exert on letter-knowledge growth during the explored time frame. To ground this hypothesis, we also take into account the finding that in a typical day, through three points of measurement between prekindergarten and kindergarten, virtually no time is devoted to vocabulary in classrooms attended by children of this sample (Mendive, Weiland, Yoshikawa, & Snow, 2016). Therefore, the stimulation that children from the books and talk HLLE group are experiencing at home seems to play a crucial role in the two domains of emergent literacy development of these children. In addition, the benefit in letter-knowledge growth from the combined effect of book exposure, conversation about the past, and teaching letter sounds and shapes at home is evidenced in the high-all HLLE group which, compared to the low-all HLLE group, reached an even larger difference of about 1 *SD* by the time children turned 6 years of age (75 months). Further studies that examine vocabulary threshold necessary to influence letter-knowledge growth, or parallel growth between the two, could shed additional light on this issue.

Notwithstanding the former explanation, it is possible that in a books and talk home environment, letter knowledge might be fostered in two additional ways. First, parents could encourage this knowledge by talking about or pointing to letters within shared readings—a mechanism called print referencing, whose effectiveness on both amount of attention to print (Evans, Williamson, & Pursoo, 2008) and letter knowledge has been documented, specifically in low-SES children (Piasta, Justice, McGinty, & Kaderavek, 2012) and in the context of a home-based intervention (Justice & Ezell, 2000). Second, parents might foster letter knowledge by reading school materials that usually focus on word and phoneme recognition—as found by Rivadeneira in a subgroup of this sample (2018). The embeddedness of letter learning in meaningful and naturally occurring practices might better align with child interests, resulting in an overall productive learning environment. Conversely, emphasizing only the explicit instruction of letters can foster this knowledge within a limited time-period, as was evidenced at baseline by the second-highest letter-knowledge development occurring around 4 years old (53 months) in children from the literacy teaching group. However, if afterward this learning is not embedded in the context of book reading, and without fitting such instruction with children's interests (including in books and in talking about past events, which constitutes relevant episodes for the child's life), letter-knowledge growth is slower, as evidenced by the nonsignificant slope for the literacy teaching HLLE group.

One question presented by the results is why the growth associated with both the high-all and books and talk group patterns were observed only for letter knowledge and not for vocabulary. The different nature of the compared skills and the types of

books parents use with their children may help answer this question. Aligned with the statement that letter knowledge is easier to teach than vocabulary (Dickinson et al., 2010), and based on the evidenced low quality of print material that Chilean families offer to their children (Susperreguy et al., 2007), it is possible that the print materials used by the high-all and books and talk families do not contain enough diversity of vocabulary and syntactic complexity to leverage vocabulary beyond the level attained at the beginning of the explored trajectory, characteristics linked to the potential of books to influence children's vocabulary between 4 and 5 years old (Sénéchal & Cornell, 1993).

The lack of association between both high-all and books and talk HLLE groups and vocabulary growth could also be explained by the fact that beyond the *frequency* of the studied processes, it is their *quality* that more strongly contributes to the language development of young children. For example, experimental studies show that mothers' use of a dialogic book reading style—that is, using questions to prompt children's comments—or an elaborative style during past event conversations—that is, characterized by open questions and feedback that scaffold children's reconstruction of the event—has a positive impact on children's vocabulary (Peterson et al., 1999; Whitehurst et al., 1988). These aspects were not captured by our HLLE items. In a similar vein, Kim (2009) suggested that, beyond parental reports, a more direct measure to capture exposure to print (e.g., Title Recognition Test used by Sénéchal & LeFevre, 2002) could reveal associations with vocabulary growth. Future research designed to study the quality of home language and literacy processes using a person-oriented approach are needed in order to refine our findings in relation to language and early literacy growth.

Implications for Policy and Practice

In practical terms, our results have implications for practitioners serving the Chilean low-SES population, and are informative for researchers interested in Spanish-speaking low-SES families living in Latin America. More studies are needed to explore whether these results are replicable in other Latin American countries. Diagnosing HLLE profiles helps maximize limited intervention resources. For example, it would be beneficial to design interventions to specifically target families from the low-all HLLE group, which makes up nearly one third of the studied sample. Teacher professional development policies are crucial to compensate for impoverished language and literacy environments at home because, on the one hand, the classroom is the second main *environment* Chilean children experience outside the home, from the age of 4 on (Ministerio de Desarrollo Social, 2017). On the other hand, low levels of availability of literacy materials and implementation of effective early literacy strategies are prevalent in Chilean preschool classrooms, particularly in those serving children from low-SES households (Mendive et al., 2016; Orellana-García & Melo-Hurtado, 2014). Failing to detect and intervene this group will translate into subsequent disparities, even within the low-SES group, given the key role that language and early literacy skills play in acquiring reading competence and meeting schooling demands (Suggate et al., 2018). Not considering the specific needs of the low-all HLLE group in instruction (i.e., higher intensity in all HLLE processes here studied) may reinforce the well-known Matthew effect (Stanovich, 1986), in which children with more stimulation at home will benefit more from literacy activities in the classroom. Indeed, this is observable in our study: the high-all and books and talk groups displayed better literacy trajectories than the other groups did.

Based on the low prevalence of the high-all and books and talk HLLE groups (36% in total), and given that such environments were developmentally beneficial in terms of vocabulary and letter knowledge, initiatives geared toward families, as well as teacher training programs, should promote past (and future) event talk, increase access to books (e.g., through libraries), expose and promote children's interest in reading, and foster print referencing in these instances. Interventions should start early. The finding that having an above average letter-word knowledge at baseline mattered for later development, highlights the relevance of implementing effective home interventions before age 4 to reduce the achievement gap that was found even within this low-SES sample.

This study has five main limitations. First, even though it is a longitudinal study, it did not include an experimental design. Thus, we cannot rule out that other confounding variables may explain the associations we found. Second, we studied the HLLE groups at the beginning of prekindergarten, but we did not explore possible changes in membership among these groups over the timeline considered in this study. Further research might explore, through latent transition analysis, the stability of the HLLE group membership presented in this study. Third, the patterns we identified are

restricted to HLLE processes with mothers. Further research about differences in HLLE based on a wider range of caregiver–child relationships would have both theoretical and practical value. Fourth, the predictive validity of the HLLE groups was tested against standardized measures of vocabulary and letter recognition. It would be valuable to explore whether these associations hold for more authentic measures that capture the complexity and diversity of children's language use in daily interactions. Finally, the patterns we identified stem from self-reported information, which in turn might limit our results in two ways. First, we are not able to distinguish the actual frequency of the language and literacy practices at home from what mothers considered desirable (i.e., most likely the higher frequency options on the measurement scale), thus further studies that incorporate direct observations of HLLE are needed to complement our results. Second, an examination of the quantity and quality of verbal exchanges, broadening talk not only to past but also to future events, as has been previously studied (Rowe, 2012), would add relevant information to these findings.

On the whole, in this study we complemented previous predictions mostly drawn from a variable-centered approach in two ways. First, our results underscore the need to understand HLLE as an amalgamation of these dimensions, which together pave the way for different language and literacy trajectories. Second, we examined an understudied, but meaningful population: Spanish-speaking children from low-SES backgrounds in Latin America. Although our findings are generalizable to the Chilean low-SES population, this study may be informative for future studies examining early language and literacy practices in Latin-American households. Such a line of research is essential for refining current definitions of HLLE and their association with language and literacy development, in a way that is sensitive to the language and cultural particularities of Latin-American households. Finally, we expanded on knowledge produced via the person-oriented approach, by showing that HLLE is related not only to early language and literacy performance at specific points, but also outlining different developmental trajectories.

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Supporting Information

Additional supporting information may be found in the online version of this article at the publisher's website:

Appendix S1. Comparison Between Characteristics of the Sample and Low Socioeconomic Population in Chile.

Appendix S2. HLLE Items in the Original Spanish Version and Fully-Worded Translation in English.

Appendix S3. Descriptive Statistics of HLE Items Used for Latent Class Analysis Analysis (at Wave 1).

Appendix S4. Means (Standard Deviations), Range, Percentage of missing and Correlations of School-Level Variables Included in Growth Model Analyses ($n = 64$).

Appendix S5. Exploration of Bivariate Residuals Among the Class Indicators and Report of Average Probabilities for Most Likely Latent Class Membership by Latent Class Models.

Appendix S6. Specification of the Final Multi-Level Model.

Appendix S7. Random Effects and Goodness of Fit of Growth Models Fitted for Vocabulary and Letter Word-ID.