Full Shelves, Good Skills? Immigration, Adolescent Language Aptitude and New Evidence on Books in the Home from Four European Countries

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ABSTRACT

Evidence suggests that books in the childhood home impacts children’s educational and occupational attainments. Previous research finds this ‘book effect’ after conditioning on parental socio-economic status and national context. Human and cultural capital theories offer plausible explanations for this book effect. However, mechanisms underlying the book effect remain empirically illusory. Drawing on previous findings, we develop theoretical arguments that human and cultural capital are not the entire story behind the book effect. Designing a formal model of all these processes, we test our claims using immigration, language and country-context to adjudicate between mechanisms hypothesized by the theories. Using CILS4EU data in four countries and structural equation modeling to test these theories’ models against the data, we find the direct effect of books does not differ between native and immigrant adolescents in predicting 9th grade language aptitude scores. Moreover, this effect does not vary much by country. Reading habits and primary language spoken at home explain only part of the effect suggesting the presence of books measures something operating independently and in addition to human and cultural capital. We expand previous theoretical explanations to include books as creating opportunities for children whose parents are unlikely to cultivate scholarly values on average.

1 INTRODUCTION

Research shows that the number of books in individuals' childhood homes predicts their educational and occupational attainments later in life. The statistical association is ubiquitous across diverse data sources and countries. Although it is not clear that books cause children to read, learn or become more socially mobile, we acknowledge a formidable *book effect* in educational and sociological research that begs further theoretical and empirical exploration.

Books in the home predict occupational and educational outcomes in addition to parental occupation and education attainments suggesting they are a key component of status transmission (Marks 2011). Some suggest large libraries of high culture books are cultural capital, thus provide access to closed elite circles (Jaeger 2011; DiMaggio 1982). Others suggest alternative mechanisms given the powerful association of just a few books in the home and greatly increased chances of upward social mobility (Evans et al. 2010, 2014, 2015). So long as parents and children use books for language, studying and critical thinking development, they are tools of human capital formation, although this seems unlikely to explain the full story behind the effect of a just a few books that theoretically could only provide a limited range of human capital. Although human and cultural capital theories are well developed, they seem to fall short in fully explaining the book effect. Our paper picks up a research agenda aimed at remedying this.

To test if and how human capital, cultural capital and other processes explain the book effect; we compare native and immigrant adolescent language skills. On average, immigrants are more likely to have different books in the home than the natives of a given society. As such, books should have a smaller relative impact on socio-economic outcomes for children of immigrants. We focus on adolescent aptitudes, in particular language skills, because these are highly correlated with adult socio-economic outcomes (see review in Fergusson, Horwood and Boden 2008). Focusing on adolescents removes the risks of confounding the effect when surveying adults (Marks and McMillan 2003). We focus on language because it is a key ability in socioeconomic mobility and immigrants and natives exhibit similar educational achievement after adjusting for language abilities (Strobel 2016). Moreover, there is no comparative research on the book effect by migration background¹.

Out of our theoretical discussion, we construct a formal model of adolescent language skills as a function of the number of books in the home net of parental socioeconomic status and language, migration background and children's reading habits. We apply this model to data from the *Children of Immigrants Longitudinal Survey in Four European Countries* (CILS4EU), conducted in England, Germany, the Netherlands, and Sweden (Kalter et al. 2016). Around half of the sample in each country are second-generation immigrants. This gives us sufficient power to test for effect homogeneity of books on language skills between natives and immigrants. We test our formal models as structural path models to test parameter constraints. By

¹ We use the term *migration background* to capture those who migrated themselves (first generation) and those who were native-born to parents of immigrant origin (second generation).

employing overidentified models we can test the likelihood of observing these data given theory, and test our theories against one another.

2 THEORIZING THE BOOK EFFECT: HUMAN CAPITAL AND CULTURAL CAPITAL THEORIES

Decades of research spawned by Coleman and colleagues (1966) suggests that family and home lives of children are often more important than school contexts in shaping educational attainment and socioeconomic (SES) outcomes. Books are a part of the home context. Several authors observe that books statistically predict status or achievement outcomes independently of parental resources and individual characteristics (Becker, B. 2011; Evans et al. 2015). Moreover, this statistical finding is unwavering across diverse societies (Ganzeboom, de Graaf, and Robert 1990; Kraaykamp and Nieuwbeerta 2000; Tsai, Smith, and Hauser 2017).

According to *human capital theory*, parents aim at reproducing social status among their children, to prevent their own status losses (Breen and Goldthorpe 1997; Esser 1999). Parents with greater economic resources can purchase better tools to improve children's educational success (Becker, G. 1993). Within this paradigm, books are one tool that parents and children use to develop children's reading, cognitive ability and language aptitudes. As human capital, the book effect should explain educational and other life chance outcomes as a function of parental investment in books (Becker and Tomes 1986; Fergusson, Horwood, and Boden 2008; Sénéchal et al. 1996). This means the book effect derives from a similar mechanism across populations. Immigrants and natives, high and low socioeconomic status (SES) and people in diverse countries should similarly benefit from human capital intentionally developed using books. However, the language skills and reading aptitude of those using books as human capital tools moderates their effectiveness (Leseman and van den Boom 1999). Immigrant or low SES students may appear to experience a smaller book effect, when in fact parents' language and reading skills are the source of variance. Thus, the human capital book effect is only theoretically equivalent for those with similar language aptitude backgrounds and conditional upon reading.

As an alternative to human capital, approaches based on *cultural capital theory* suggest that cultural artifacts and knowledge provide the symbolic status necessary for children to attain the status distinctions of their parents, if not gain entry into higher status positions (Bourdieu 1986; Bourdieu and Passeron 1990). We follow a working hypothesis of cultural capital as an institutionalized system of elite closure (Lamont and Lareau 1988). In this format, books are one of many Beaux-arts materials and experiences that provide culturally imbued resources outside of skills and skill formation that signal the status needed to access social circles with high degrees of closure (a key, albeit not the only argument of Bourdieu's extensive writings).

In the school setting, teachers reward cultural capital. Even if they themselves are not members of the elite, teachers perceive children with highbrow cultural capital as higher performing, independent of their objective performance (DiMaggio 1982; Lareau 2015). By giving them greater attention and higher evaluations, these students have higher marks, confidence and self-efficacy which lead to better chances of accessing higher school tracks and higher status outcomes later in life compared to students with other types of cultural capital.

To activate this positive bias, only a tacit knowledge of the books and their contents is necessary for books to have an effect on children. For example, a student might have several Greek tragedies in his/her home and be able to recount the titles of some, or the names of some characters without having read them, thus signaling high status to a teacher. As cultural capital, the book effect is categorical. Either students have elite cultural capital or not. A large home library or a library filled with particular elite books provide signals of high culture. Therefore, a small number of books in the home should be less likely to give a cultural capital book effect. DiMaggio (1982) elaborates on the cultural knowledge necessary to use cultural capital artifacts to produce SES outcomes. Students from non-high culture background lack the appropriate cultural socialization to know how to access returns from cultural capital. Accordingly, even a large number of culturally dominant books are less likely to improve life chances for low SES students.

This means that books should have a smaller impact for immigrants who are less likely to possess the dominant cultural knowledge even if they have high culture books. Such immigrants may face educational and labor market discrimination further interrupting their capacity to signal elite status. Therefore, several mechanisms of our operational theory of cultural capital point toward books having a smaller impact on immigrants' outcomes on average. In the language of formal modeling, the cultural capital argument suggests that the effect of books is heterogeneous for immigrants and non-immigrants and that immigration background moderates the book effect.

The human capital mechanism underlying the book effect may be more pervasive than some cultural capital scholars suggest. Research claiming to identify cultural capital book effects may mistakenly capture human capital effects. In the work of DiMaggio (1982) on mobility, just a little cultural capital gives low SES students the opportunity to access higher statuses. His findings along with those of De Graaf, De Graaf and Kraaykamp (2000) suggest that cultural capital improves high school grades and educational attainment. However, a closer inspection of their "cultural capital" measurement reveals that they include student or parental reading habits. This blurs the boundaries between cultural capital and human capital as reading is a form of active development of human capital (see also Georg 2004). In the De Graaf et al. (2000) study the authors run a sensitivity analysis splitting the scale into its Beaux-arts and parental reading components as separate variables, finding ultimately that parents' reading habits matter, whereas Beaux-arts do not.

3 EXPANDING HUMAN AND CULTURAL CAPITAL THEORIES

If not human capital or cultural capital, what is the book effect? Spaeth's *scholarly culture hypothesis* (Evans et al. 2014), suggests that family households embody a range of scholarly cultural values. Households with more books have parents who respect, appreciate, read and cherish books and scholarship in general. This results in children with higher levels of intellectual complexity and aptitude on average. Therefore, books in the home provide something unique for children beyond their utility as tools for developing human capital and beyond their signaling of elite status. A similar argument comes from Lareau's idea of *concerted cultivation* (2002). Based on Bourdieu's work on parenting styles, she locates this cultivation effect outside of the functional form of cultural capital as elite closure. The theory and evidence suggest children with the higher status chances

in life have parents that cultivate critical thinking and task management, whereas children whose parents are authoritarian more than reasoning and do not focus on organizing tasks have far lower chances. Similar arguments and findings abound in mobility research (see Fergusson et al. 2008:279). The result is that higher status children, in addition to any human capital development, are literally better equipped to learn and perform in school because of additional parental values and behaviors unrelated to human capital formation. These scholarly values or parenting-style arguments suggest that books are an indicator of the types of parental values and behaviors that cultivate higher status chances for their children. Parents have books that reflect their values and parenting styles.

A third argument emerges alongside the scholarly culture hypothesis. We argue books may be more than simply a reflection of parental values. We are aware that there are households with some books that have parents who do not have scholarly cultural values or engage in concerted cultivation of complexity and task organization. If children from such households have higher status chances in life on average then it is possible that *the presence of books* creates status opportunities not previously discussed in academic literature. Children may become aware of the value of books because their parents have more scholarly values that lead them to cultivate book awareness or simply because the children notice the books on the shelf and become curious. Anything present in a childhood home, whether the parents pay attention to it or not, might be of interest and have an impact on a child. This is something analogous to research showing that the components of neighborhoods or the availability of toys and objects affects child development and educational skills independent of parents (Bradley, Caldwell and Rock 1988; Brooks-Gunn 1993). This gives the book effect a random quality, where the presence of books in the home creates an opportunity for children to develop cognitive complexity and scholarly values perchance, independently of the parents.

Although the ‘perchance’ book effect has no direct empirical support thus far, findings by Engzell (2018) provide important first evidence. He shows that lower SES children are more likely to exhibit innumeracy regarding the number of books in the home. In particular the low SES children engage in underreporting, whereas high SES children are more accurate. This finding is consistent with the scholarly culture hypothesis with high SES parents being more likely to present the value of books to their children, leading to more *awareness* and thus also more accuracy in reporting the number of books. This would also help explain Engzell’s other finding that lower SES children are less likely to accrue books. We speculate that lower SES parents are less likely to present the values of books to the children giving them no direct incentive to heed any books on the shelf or seek them out. However, if there are books in a low SES home it increases the chances that each child in the home discovers the value of these books independently of the parents and therefore explains the large error in the lower SES children’s reporting of books found by Engzell. This would be consistent with previous findings showing that just a few books in the home have a tremendous impact on SES outcomes later in life for low SES persons (citations throughout).

Of course this shifts the causal mechanisms away from the books and into the children who may be more or less predisposed to having and valuing the books, and in particular their parents. Yet we argue that having books around could also lead, at least certain children, to become more likely to discover their value and

in turn do better in school. After all, books associate with communication or thought processes open to new and complex developments in children (Foy and Mann 2003; Skubic 2014). More books in the home correlate with positive attitudes toward reading, suggesting that the presence of books might independently increase the likelihood that children adopt bookish and scholarly attitudes (Mullis et al. 2016). The idea that the presence of books could cause awareness is a general mechanism and should apply to all book formats and across diverse individuals (Payne, Whitehurst, and Angell 1994). Moreover this awareness mechanism should operate independent of reading and parental SES (Barone, Mallette, and Xu 2005; Goodman and Goodman 1979). Our arguments also suggest that the average effect of books in the home on skills and SES outcomes is proportional. Each additional book in the home indicates an equally likely increase in scholarly values or the awareness needed to discover such values net of other factors, and thus each book leads to a proportional increase in SES and skill outcomes on average. From a formal modeling perspective, parents and reading habits do not fully mediate the book effect, and the book effect is homogeneous between natives and immigrants.

4 IMMIGRATION AND HYPOTHESIZED BOOK EFFECTS

We consider immigration a phenomenon that allows us to test some of the unknowns related to human capital, cultural capital and the book effect. For one, there is no comparative research on the book effect between natives and immigrants. Second, scholars previously tested the elite closure argument only using the quantity books (Evans et al. 2010, 2014, 2015), whereas cultural capital speaks to the qualities of books as well. Previous research shows that immigrants tend to be less equipped with cultural capital (Jungbauer-Gans 2004; Lee and Kao 2009). A simple reason for this can be that immigrants do not take along all their books when they migrate. However, immigrants are less likely to have or be interested in the types of books necessary to enter elite circles in the dominant culture of the host society. They are less likely to have the same language and culturally relevant books (Dali 2012; Listwon and Sen 2009). Therefore, immigrants should not benefit to the same degree as natives because of the quality-side as much as the quantity-side of elite closure arguments. This means that children will not develop the same rewards from teachers (Leopold and Shavit 2013). Thus:

In comparison to natives, the book effect on adolescents' language abilities is substantially less for...

H1: those with a migration background, and

H2: those with a non-native language primarily spoken at home.

The mechanisms in H1 and H2 suggest the contents or types of the books matter for shaping outcomes. Unfortunately, we lack comparative data on the contents of books. Therefore, our hypotheses are our way of proximally identifying qualitative book differences using language and migration background (see Becker, B. 2010).

This gives a prediction linking to the backgrounds of families. We expect that scholarly values impact children with and without immigration backgrounds equally. Regardless of the reasons for migrating, foreign-

born individuals and second-generation migrants have lower educational attainment, occupational status and incomes than non-immigrants on average (Heath and Brinbaum 2007; Kalter and Granato 2007). Most research on culture and phenotypically-based differences between individuals suggest that race, cultural background and ethnicity have little to do with this stratification, and instead the differences are a product of access to socioeconomic resources, in particular parental SES (Marks 2005; Kristen and Granato 2007). As books are a covariate of stratification across so many spheres of society, we extend this argument to the number of books in the home. If the theoretically causal mechanism is the scholarly values of parents or symbolic power embodied in the books, then there should be a book effect independent of their contents and the reading habits of the children. Moreover, each additional book should reflect a gain in households' available scholarly culture values, whether or not these come from the parents or the child. The children only need to be aware of the books in the home thus opening the door for developing knowledge of the power and value of books.

We expect that human capital and cultural capital theories also offer plausible mechanisms in addition to scholarly culture, therefore our hypotheses are predictions net of these other mechanisms.

H3: The book effect on adolescents' language abilities exists in addition to those of human capital and cultural capital.

This means that looking at different groups by migration background or language at home should produce the same book effect. These are predictions in opposition with H1 and H2. How strongly academic abilities are determined by students' socioeconomic backgrounds varies across the countries: While the correlation between different indicators of family wealth like parents' occupational status or cultural possessions at home with students' reading literacy are the highest in Germany and the UK, in Sweden this correlation is weaker (OECD 2001). However, given that the mechanisms of how books enhance students' language skills through both human capital and scholarly culture, we expect that H3 should hold true across countries and therefore types of culture, suggesting what we expect a universal book effect after conditioning on several diverse factors.

H4: Across countries, tests of H3 produce the same results.

5 TESTING THE THEORIZED BOOK EFFECTS

Figure 1 presents theoretical causes of adolescent language aptitude conceived of as test scores (LAN_TEST)². The path model is a formalization of theory. The theory contains causal arguments that we aim to translate into path models. These path models are however just theory and do not indicate that we know causality or causal effects. The book effect is path **b**. Human capital transmission through book acquisition and reading occurs along paths **c** and **a**, impacting aptitude via paths **b** and **d**. If human capital is a causal mechanism behind the book effect, path **e** is relevant. If more books in the home signals greater human capital investment then

² The path model is a formalization of theory. The theory contains causal arguments that we aim to translate into path models. These path models are however just theory and do not indicate that we know causality or causal effects.

books should beget reading behaviors, because parents' reasons for acquiring books would be coterminous with their usage. Our test for effects of cultural capital and scholarly culture both posit that an effect of books exists independent of the human capital process. Thus, our tests are only valid when conditioned on human capital along paths **a**, **c**, **e** and **d**. If path **b** exists, after conditioning, this suggests either cultural capital or scholarly culture. If cultural capital, then both **f** and **g** should be less than zero leading to a book effect **b** smaller for adolescents with an immigration background (H1) and a non-native language spoken at home (H2). Alternatively, a universal book effect means **g**, **h** and **i** should be zero except for measurement error, as predicted by H3 and H4. In other words, no difference by non-native language and immigration background, and evident across countries.

- Figure 1 about here -

To populate our formal model with statistical estimates, we employ structural equation modeling (SEM) techniques. Our theory as expressed in the Figure 1 model dictates certain structural relationships implying statistical properties that we should observe in the real world, so long as a given hypothesis is true. When we measure variables using real-world data, we have *observed covariances*. The model itself gives us *implied covariances* between several variables; for example, H3 and H4 imply that the partial covariances of **g**, **f**, **h** and **i** are all zero. Our goal is to test if these theoretically implied covariances match those we observe within a plausible range of random error. Because our SEM runs on an overidentified model, meaning there are several possible solutions to fit the implied covariances into the observed data, allowing us to test if we committed model specification errors (Bollen 1989). Given that we have immigration background and different countries, we run multigroup SEM allowing us to test whether parameters are the same or different across groups through the usage of model constraints. Comparing different models to each other allows us to draw conclusions about which models perform worse (see any basic SEM text, e.g., Kline 2015). Overall our tests rely on hypothesized effects' significance and direction (in H1-H4), and whether effects are similar across groups predicted (H3 and H4).

5.1 Data and Measures

We need a large sample of immigrants to provide the degrees of freedom to perform multivariate analyses by language, background and country. These requirements severely restrict data choices. Single country surveys such as the National Educational Panel in Germany have large samples of students with migration backgrounds, but are not comparative across countries. Data such as PISA are comparative but have small immigrant sample sizes, meaning weaker tests; a problem that increases with the number of independent variables. Cross-national comparative data with immigration over-samples are very rare. We use the CILS4EU data (Kalter et al. 2016) containing nearly equal-sized representative samples of natives and immigrants in England, Germany, the Netherlands and Sweden. The students were mostly 14-years-old with a level of cognitive development for understanding survey questions, and old enough to observe book effect exposures

leading to variations in abilities.³ Finally, CILS4EU data Wave 1 contain questions on number of books in the home and a language aptitude test, both critical for our hypotheses. One drawback of CILS4EU data and practically all comparative book data to date are no questions over the types of books⁴, thus one argument of cultural capital regarding the contents of books is not testable. However, the data allow measuring whether a foreign language is spoken predominantly at home allowing us to test H2-H4 by proxy.

We measure our dependent variable *language aptitude* (LAN_TEST) as an indicator of academic ability and achievement from an aptitude test built into the survey. It is a scale of 25 (England and Germany) or 30 (Sweden and the Netherlands) test questions that reflect a reduced version of common standardized academic tests.⁵ Higher scores represent better language aptitude in the primary native language of the country (CILS4EU 2016:40). As the test in each country varies slightly we do not expect these measures to have similar intercepts or variances, therefore we focus on relative variance through XY-standardization.

We measure *number of books in the home* as a continuous categorization of the midpoints to survey responses “0-25” = 12.5, “26-100” = 63, “101-200” = 150, “201-500” = 350 and “more than 500” = 750. Then we take the natural log (variable label: BOOKS) of this continuous variable to highlight the differences in the book effect at the lower end of the distribution, consistent with previous research (Evans et al. 2010, 2014)⁶. We measure *reading habits* (READS) as how often the respondent reports spare time, non-school reading. We take a continuous coding: every day = 5, once or several times per week = 4, once or several times per month = 3, less often = 2 and never = 1.⁷

We measure independent variables of *mother’s* and *father’s education* (MOM_ED and DAD_ED) using a continuous variable where missing and less than primary = 0, primary = 1, secondary = 2 and tertiary = 3 for each parent.⁸ We are aware that this variable is not conceptually continuous but this is the best we have given data and societal differences (Schneider and Kogan 2008); we forcibly accept some measurement error here. Education is our indicator of parental SES. We cannot measure income without severe missing data problems. Using this variable categorically does not improve model fit, supporting our continuous measurement with error.

³ Students attending 10th grade in England, 9th grade in Germany, 3rd grade of secondary school in the Netherlands and 8th grade in Sweden were sampled.

⁴ Except the NEPS, but again this is not comparative.

⁵ In Germany, parts of the KFT 5-12+R (Heller and Perleth 2000) and in the Netherlands parts of the NIO (Van Dijk and Tellegen 2004) were used. Similar tests were designed in England and in Sweden by the project teams. For further information, see the technical report for the data (CILS4EU 2016).

⁶ Models using the continuous instead of logged variable lead to worse fit with similar result patterns.

⁷ Our first coding attempts were to take the number of days per year and then take the natural log. Using both a continuous days-per-year measure and a logged version of it, but this led to poorly fitting results, whereas the simple 1 through 5 coding fit the models to the data very well. We speculate that the response categories were too broad (5 steps from never to every day) and too vague (e.g., “once or several” and “less often”) for the respondents to accurately place themselves on the continuum in terms of precise number of days per week or month. Thus, they ostensibly responded ‘continuously’ to the question.

⁸ The logic is that if a child is not aware of their parents’ educational attainments, it suggests that the parent’s education is not a source impacting the child’s academic achievement or the child has a weak or non-existent relationship with the parent. In either case, a zero is appropriate. More importantly, the amount of missing data from parents unwilling or unavailable to respond to the survey is very large and very different by country from 22% in the Netherlands to 63% in England, so relying on parents’ linked data does not work. Even if we had reliable measures of income or occupational status, their inclusion in the model would introduce endogeneity with parental education.

We measure whether a *foreign language is predominantly spoken at home* (FGN_LANG) by dichotomizing responses to a question asking how often a non-native language is spoken at home. We code this question with always and often = 1 and sometimes and never = 0. We divide the sample into groups of *native* with both parents born in the survey country, and *immigrant* as those with both parents born abroad (“Immigrant” in Figure 1) given that children of mixed marriages might have confounding factors relating to their language skills (Becker, B. 2011). To check this, we run additional models with immigrants coded as at least one parent born abroad. For first generation immigrants it is crucial to consider the age of migration for developmental and acculturation reasons (Esser 2006), and we add this variable (AGE_IMM). The younger immigrants were upon immigration, the longer their exposure to the language and school system of the receiving country.

Table 1 presents descriptive statistics (see Appendix). Table 2 presents correlations. There is a smaller correlation between books and language aptitude scores for immigrants with two foreign-born parents (0.16) than for immigrants with one or two foreign-born parents (0.24) and natives (0.25). As H4 suggests a relatively universal book effect, we seek to test if this difference reflects a weaker statistical relationship of books and language test scores for those with two immigrant parents. The correlations between parents’ education level and child’s reading habits with test scores are very similar to the size of the correlation between books and test scores. Correlations are low-to-moderately sized suggesting we do not have any collinearity problems.

- Table 2 about here -

5.2 Methods

Table 3 presents descriptions of our different models in the column “Group Structure and Model Definitions” (see Table 4 in Appendix for sensitivity models). The reason we have so many models is that we test for differences for immigrants and natives, foreign language spoken at home and by country. This means the multigroup structure changes depending on the model, thus changing the reference model. Our first test is if a model displays absolute fit. There is no statistical test that can confirm our theory (Hayduk et al. 2007); however, chi-square tests reveal if our formal model does not fit the data and should be rejected. Thus, for each model, we run an *exact fit* test (Kline 2015). The p-value of this test reveals at what significance level the model implied covariance matrix is different from the observed covariance matrix in the data, e.g., 0.001 implies that our model is vastly different from the observed data and should be rejected. Alternatively, 0.050 or higher implies our model is not much different and *could be* a good model.

Our next test is if statistical coefficients have size and significance, and crucially if we can constrain them to equality without loss of fit. We run models using *Mplus 7* SEM software, listwise deletion and a scale-shift estimator (MLMV) correcting for the potential non-linear relations in our data. This accounts for the roughness coding mid-points in the books measure, allowing for non-linear measurement error. It also accounts for parents’ education measured in four rough categories potentially suffering from a non-linear bias⁹. This

⁹ Skewness/kurtosis tests confirm this.

correction leads to better estimates and most importantly recovers accurate chi-square tests (Asparouhov and Muthén 2016). Given the potential biases of listwise deletion, we run a second round of all models using full-information maximum likelihood (“FIML” in *Mplus*, see Table 4 in Appendix).

We run statistical analyses after country-mean centering books, parents’ education and reading habits variables. This eliminates potential country-level confounding on observed variables. Previous research finds that economic development has a strong effect on number of books in the home and may explain some of the book effect and we want to control for this in our tests (Evans et al. 2010). We want to test our book effect as independent of country-level factors as possible. There will be inevitable variation in educational success, culture and academic environments that ends up in the error terms.

6 RESULTS

6.1 Model fit tests

Table 3 presents model fit tests. The first column are model names (M1...M99); chi-square value (X^2) in the second and degrees of freedom in the third (df). ‘Exact_F’ is an exact fit test using FIML and ‘Exact_M’ with MLMV. ‘Equal’ is a fit test of the current model against the comparison model (see Table 3 footnote a). Finally, a description and hypothesis testing. All models test H3 in some form, namely that a positive and significant book effect exists net of parental education and student reading habits.

- Table 3 about here -

In M1 and M21, both exact fit tests reveal that the structural model’s implied relationships are not significantly different from those observed in the data ($p>0.05$). This gives no reason to reject our theoretical causal model, and with strong fit statistics (see Table 6 in Appendix), we have evidence supporting our theoretical model. The equal fit tests compare each model with a freely associated model, and unsurprisingly, M1 and M21 fit the data significantly better at $p<0.001$ (Kline 2015; Rigdon 1994). The coefficients for the book effect are positive and significant across all 16 groups – 4 countries by 2 backgrounds by 2 language categories (see Table 5 in Appendix). This is initial evidence in support of H3. However, these two models fit the data so well that we worry about exclusion restrictions. They ‘behave’ more like justidentified models than overidentified models (discussed in Hayduk 2014). We need more restrictive testing for H3 and H4.

The models after M21 provide these tests, and are the center of our analyses. In M22 and M23 we force the book effect to one half the metric size among those speaking a foreign language at home (M22) and those with a migration background (M33) in comparison with natives and native speakers (again, see Table 4 in Appendix). These subsequent tests of H1 and H2 pass both exact fit tests with FIML but fail with MLMV. They fail the equal fit tests revealing that M11 (the model with more df) fits the data significantly worse than M22

and M23 at $p < 0.010$ respectively. This is evidence to reject H1 and H2 predicting a smaller book effect on language skills for immigrants, particularly when a non-native language is predominantly spoken at home.¹⁰

In M24 and M25 the book effect is constrained to unstandardized coefficient equality within countries respectively across groups by language and migration background. These models pass Exact_F and Exact_M tests, implying no difference in covariance structures and thus good fit. This is support of H4 assuming similar book effects on language aptitude for native and immigrant students; however, stronger support comes from the equal fit tests showing that both models are *not* significantly different from M21 at $p < 0.01$. This means they are favorable because they are smaller (i.e., more parsimonious/more df). We conclude that an identical book effect across all 16 groups is likely given these data. However, we cannot fully rule out M22 which is not significantly different from M21, lending caution to the strength of our results. To check this we run an additional equal fit test between M22 and M24. Given their identical degrees of freedom, the lower X^2 supports M24. We do the same for M23 and M25 finding that M25 is better ($p < 0.001$). This lends strong support to H4 and further evidence against H1 and H2.

From M26-M30 (similar to M6-M9) we simplify the grouping structure to countries and background only (8 groups: 4 countries by 2 backgrounds). There is a strong association between language spoken in the home and immigrant background leading to some matrix cells without many categories (see Table 7 in Appendix), a restriction leading to more robust results statistically speaking. M27 is plausible with an Exact_F and Exact_M of marginal significance ($p > 0.01$). Moreover, it is similar to M26 in the equal fit test ($p > 0.001$). This is weak support of H3. However, we are unable to support H4 that the book effect is identical across the entire sample including all groups, as M28 fails both exact and equal fit tests. Digging deeper we realize that unobserved heterogeneity by country could account for this because M29 starts to show signs of covariance similarity (at $p > 0.001$) when we allow different intercepts in the German group. Freeing just one country while keeping book effects constrained within the country achieves decent models in M9 and M29. We determine which country to free based on modification indices. At first blush, this shows *how little we need to free to make the model fit*; i.e., that country heterogeneity is a very small problem. We see that although freeing England in M9 or Germany in M29 leads to different metric book effects, the standardized coefficients are not particularly different (see Appendix Table 5). This in itself is a finding pointing directly at a similar data generating process across countries.

Mathematically identical effects may not represent real-world identical effects if groups have different distributions on books or language aptitude (after adjusting for covariates). Thus, we run M30 where regression coefficients are constrained to be roughly equal as standardized coefficients, meaning that effects now take on similar sizes relative to the distributions in each group. This leads to a model with decent exact and strong equal fit results (at $p > 0.025$), and solid model statistics (see Appendix Table 6: RMSEA 0.19, TLI 1.00, CFI 0.99, AIC same as M26 [± 5], BIC is 60 points less than M26 and 20 less than M29). After manual adjustments up and down, we have non-significantly different standardized coefficients ranging from 0.18 to 0.25. This

¹⁰ We tried different sizes of reduced effects but we settled on $\frac{1}{2}$ because it was the minimum sufficient to make the smaller set of coefficients significantly different from the larger across all groups.

supports H4 and again points at a data generating process that is similar across countries. We run an additional equal fit test to see if this relative ‘universal’ book effect model performs better than M29. We confirm it is not significantly worse ($p = 0.122$), and with two fewer df, it is preferable.

6.2 *Visualizing the Results*

Given evidence of a universal book effect with little-to-no variation by country and by migration background, we develop models that exclude the country structure and instead use the four countries as dummy variables in pooled data in M98/M980 and M99/M990. These models have only two groups, migration background and native background. These models provide a visual summary of the book effect and variation in adolescent language aptitude, and a parsimonious model of our theoretical arguments. There are slightly different coefficients for different groups on covariates, but overall this simple grouping structure provides an accurate picture of the models with the 8 and 16 groups (see Table 5 in Appendix). Moreover, these simplified models fit the data well with the book effect restricted to be identical between natives and immigrants. This suggests that differences on either unobserved country-heterogeneous variables or differences on our actual observed variables account for some of the observed differences in the book effect; otherwise, fit tests would have failed. Figure 2 provides the results of M99 along the path model. The figure includes both metric and standardized coefficients [in brackets] for native and immigrant background groups (see Figure 3 in Appendix for immigrants with at least one parent foreign-born).

- Figure 2 about here -

Expecting a book effect to be strictly identical across countries or groups is not realistic in a complex and diverse causal world. However, after adjusting for some of the complexities, we find it plausible that there is a universal book effect within a narrow range across contexts after adjusting for theoretical confounders. In Figure 2, the standardized coefficient 0.66 in both models represents the size of the universal book effect. That means that for every standard deviation higher in number of books in the home, student language test results predict a 0.66 standard deviations higher language test score on average. Given that our book measure is a natural log, this means the correlation is curvilinear more pronounced at the lower end of the distribution of books in the home (closer to zero) and flattening out at the higher end (with hundreds of books). Figure 4 displays the statistical impact of number of books in the home on language aptitude in standard deviations for immigrants (with both parents foreign-born) and natives (Figure 5 in the Appendix gives the same graphic for one-parent foreign-born immigrants), given our model. It is a causal impact if our model takes into account all possible confounding processes and sources of non-random error. This is too great a burden on our model, thus we only conclude with certainty a statistical impact, not an inferentially causal one.

- Figure 4 about here -

Our hypothesis tests come from absolute and relative model testing in our structural equation models, but Figure 4 demonstrates visually what the so far calculated numbers and figures cannot: The magnitude of the book effect and its similarity between natives (dotted line) and immigrants (solid). Shifting from 0 to 10 books statistically improves language skills by 0.4 standard deviations. Moving to 25 and then to 50 increases this to 0.5 and almost 0.6 standard deviations respectively. The native-immigrant gap is not significant and if it were would represent less than 0.1 standard deviations difference for those with many books and nearly 0 difference for those with few books. Of course, we mean-centered the language scores within groups to account for the fact that immigrants have over 2 standard deviations lower scores on average than natives across the four countries.

To be clear, this apparently universal effect exists independently of human capital and cultural capital mechanisms as captured statistically in our models. In all four models, the *freely estimated effect of books on reading is roughly zero* (0.01 standardized). If human capital were the sole driving force in the book effect, parents' reasons for purchasing books would be the same reasons they push their children to read: because the books are tools of human capital. Yet we see that almost all of the reading effect comes via parents' education, entirely by mother's education in fact, which renders the multivariate effect of father's education nil. Note that mother's education has a freely estimated standardized coefficient of 0.96 for both natives and immigrants. A huge effect by any imaginable criteria. Thus, human capital plays a major role, *but only directly from parents' education to books and reading, not indirectly from books through reading, therefore reading cannot mediate the book effect*. As tools of human capital, the books do not lead children to read more, but still have an impact on academic aptitude. We also do not find evidence of cultural capital as a mechanism of elite closure. Cultural capital might work differently for immigrants and natives, but it does not distort the book effect here. *Immigrant or non-native language background does not moderate the book effect*. Thus, there seems to be no general cultural capital advantage in the book effect for natives. This is evidence of both H3 and H4.

7 DISCUSSION

In this paper, we reproduced a common finding of a significant statistical positive effect of books in the home on markers of social mobility. In our case, adolescent language skills. More concretely, we identified a relation between books in the home and adolescents' language abilities that exists after conditioning on parental education and adolescents' reading habits. Expanding the knowledge base of previous research, we tested the impact of books on language aptitude for native compared with immigrant students. Including immigrant students in our analyses provided us with the opportunity to proximally test if the positive effect of books remains after conditioning on language and native elite culture. We tested this assumption for 14-year old students in varying contexts using data for adolescents in England, Germany, the Netherlands and Sweden, surveyed in 2010 and 2011.

Our results speak in favor of a universal book effect that does not appear to significantly differ between natives and immigrants or by language spoken in the home in its impact on a language aptitude test for

adolescents in all four countries. Using multigroup structural equation modeling, we found that constraining the book effect to be equal between natives and immigrants fits the observed data well. This means that our formal path model is an equally good explanation of what we observed in the data compared to a model without theoretical assumption with the book effect freely estimated across groups and between variables. These results held true when we defined immigrants as having at least one foreign-born parent or as strictly with two foreign-born parents; and held when dividing native and immigrant groups into those that speak the country's native language primarily at home versus not. Thus, we find further evidence of a universal book effect that exists independently of human capital (measured as parent's education and children's reading habits), and cultural capital (in the elite closure form, as seen in a unit-by-unit increase that is roughly equal for natives and immigrants, and those with or without the native language spoken at home). The latter suggests there is no threshold of books or type of books effect, supporting previous findings albeit with a much stricter model targeting covariance structures.

Our formal model derives from the causal arguments in human and cultural capital theories, but we cannot rule out all sources of potential confounding and therefore cannot argue along orthodox causal lines. Much of the black box of the book effect remains enshrouded as we lack questions on book types and parent-child book interactions, thus our findings are limited to the strength of the data and are evidence of total (causal) effects that might contain confounders going in either direction. But our evidence speaks loudly against human capital or cultural capital as the only features of the book effect. Our evidence also suggests that the book effect exists for lower socioeconomic background children. According to Lareau and Bourdieu's work, and according to the scholarly culture hypothesis, lower SES parents do not normally offer their children concerted cultivation of the values that bring them success in academic settings and in later life mobility. This is supported in our data to some extent with parental education having an effect on adolescent test scores; however, the fact that books matter independent of parental education – in other words matters equally for low and high educated adolescents – is evidence that the books themselves provide opportunities for the children that unlikely come from the parents' scholarly values or concerted cultivation. Thus, the universal book effect comes both from parents and in a per chance form given the books' presence in homes. More research should confirm that books themselves give a random opportunity for children to discover bookish values.

We suggest a harmonious extension of the scholarly culture hypothesis alongside cultural capital explanations. Our findings in M30 suggest that cultural capital might remain a factor. Although M30 is not a 'smoking-gun' at $p > 0.001$ for exact and equal fit tests, it is evidence of tiny variance in the book effect that remains alongside the large common variance across countries and immigrant versus native background groups. This variation is evident in *slightly smaller* effects for the immigrant background group (standardized coefficients from 0.18 to 0.21) compared to the native group (0.20 to 0.25)¹¹. Looking at models where the effect is constrained to mathematical equality in unstandardized coefficients, the standardized effects sometimes

¹¹ Although we use caution here because even standardized effects can mask variance properties that signal alternative processes across groups.

appear slightly smaller for immigrants as well, for example M29 (see Table 5). Although these differences are not statistically significant in a Wald test, they are suggestive that there might be some small effects attributable to cultural capital in the qualities of the books. Effects that slightly reduces the impact of books on adolescent achievement for immigrants.

The scholarly culture explanation does not fully exclude human capital arguments. Both father's and mother's education are critical predictors of number of books in the home. As we know that higher status parents seek to pass their status on to their children, we assume that books are one component in this process including several other tools such as computers, tutors, and logic-solving games. Thus, a desire to transmit human capital may increase the likelihood that children become aware of books because of other human capital development tools unobserved in our data. This is a big claim, requiring that parents of low SES background in particular must be aware of the value and power of books and attempt to transmit this as a means to furthering their child's life chances, *while not pushing the child to read more*. This is an unlikely version of human capital in the realm of our logic, but we cannot rule it out based on these data.

This research has some further shortcomings. We expect number of books and reading habits are reciprocally causal. Children who enjoy reading demand more books from their parents, or parents reward reading habits with more books. By having path *e* in the model (see Figure 1) we hope to control for this reciprocal process without explicitly modeling it, as this would require additional model parameters that we do not have (i.e., variables or known, non-causal paths). Also, were unable to test our hypotheses on immigrant groups with different backgrounds by culture or country of birth. It is possible that by lumping high status immigrants with blue-collar, unskilled immigrants, or Eastern Europeans with Muslim-culture immigrants that the heterogeneous book effects appear similar due to pooling. However, a similar argument could be made for heterogeneous native groups. We think this is unlikely to be a serious problem for two reasons. The first is that we control for parents' education and this should roughly capture much of the socioeconomic status of the household. The second is that if single groups had wildly different effects within the group we would expect the book effect to be non-significant or the model fit statistics to inflate, and this is not what we observe. Yet, we made a strong assumption that immigrants and those speaking a foreign language at home have, on average, books with diverging contents than natives. In future cross-national surveys our hope is that the exact contents of books will be queried such as how many classics, collector's items, high culture, and so forth.

Another issue might be lack of information on whom the books belong to or where they are located. Even if parents own a large number of books, their children might not necessarily interact with the physical space where the books are located. Moreover, some children might have many books in their own bedrooms and other siblings not. As we consider the amount of time spent reading books outside of school, we consider (at least partly) whether students are actively using books in their homes. What this points at is the need to consider the measurement error associated with books in the home, and to find ways to survey the awareness mechanism proposed by our theory. This measurement problem is further exacerbated in CILS4EU because, unlike PISA, there is no answer category "none" for the number of books in the home. Instead, respondents who have no books in the home are lumped into the category with those having as many as twenty-five. Previous

research demonstrates that the purpose of logging the actual number of books captures the huge differences between those with no books and those with just a few. We suspect that this under-represents the size of the effect because of the unobserved gap at the lower end of the distribution.

In conclusion, our findings suggest that more books in a childhood home increases the chances that the child will perform better in school and, as a result attain higher socioeconomic status later in life independently of parental education and child reading habits. We argue that books increase the likelihood of the child perchance becoming aware of them and in doing so, gaining complexity, open-mindedness and scholarly values. Simply adding books to a home should have an impact on children's chances in life, but this impact is nothing like the impact that parents' education has on aptitude both directly and indirectly on aptitude through more books in the home and increased reading habits in the child. Given a policymakers' or parents' desire to improve children's chances in life, a cost-benefit analysis ensues weighing the cost of giving books to parents (and trying to enforce that they keep them at home and show them to the children) versus educating the parents on the values of scholarly culture and how to transmit them to the children.

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TABLES

Table 2. Observed Correlations for All Variables by Migration Background

----- Native -----								
	LAN_TEST	Books (c)	BOOKS	READS	FGN_LANG	MOM_ED	DAD_ED	IMM_AGE
LAN_TEST	1							
Books (c)	0.17	1						
BOOKS	0.25	0.83	1					
READS	0.23	0.28	0.35	1				
FGN_LANG	-0.11	-0.01	-0.02	0.00	1			
MOM_ED	0.20	0.18	0.21	0.11	-0.09	1		
DAD_ED	0.18	0.18	0.21	0.10	-0.07	0.62	1	
IMM_AGE	-0.08	0.00	-0.02	0.01	0.19	-0.08	-0.06	1
---- Immigrant, one parent ----								
	LAN_TEST	Books (c)	BOOKS	READS	FGN_LANG	MOM_ED	DAD_ED	IMM_AGE
LAN_TEST	1							
Books (c)	0.18	1						
BOOKS	0.24	0.82	1					
READS	0.15	0.21	0.26	1				
FGN_LANG	-0.25	-0.13	-0.17	0.01	1			
MOM_ED	0.21	0.19	0.24	0.08	-0.12	1		
DAD_ED	0.16	0.18	0.23	0.11	-0.04	0.52	1	
IMM_AGE	-0.15	-0.03	-0.06	0.07	0.19	-0.01	-0.01	1
---- Immigrant, both parents ----								
	LAN_TEST	Books (c)	BOOKS	READS	FGN_LANG	MOM_ED	DAD_ED	IMM_AGE
LAN_TEST	1							
Books (c)	0.10	1						
BOOKS	0.16	0.80	1					
READS	0.15	0.18	0.24	1				
FGN_LANG	-0.13	-0.07	-0.09	0.01	1			
MOM_ED	0.18	0.15	0.20	0.08	-0.05	1		
DAD_ED	0.15	0.15	0.20	0.11	0.01	0.53	1	
IMM_AGE	-0.10	0.02	0.00	0.08	0.10	0.04	0.02	1

Note: Pairwise Pearson Correlations. For variables descriptions see Table 1 and the text. "Books (c)" refers to the un-logged measure of books.

Table 3. Models Testing The Book Effect on Adolescent Language Aptitude. 9th Graders.
CILS4EU Data, England, Germany, the Netherlands and Sweden.

Model	X^2	df	Chi-square tests ^a			Group Structure & Model Description ^b	Test	Constraint (Figure 1)
			Exact_F	Exact_M	Equal			
One Immigrant Parent (at least) / 16 groups								
M1	16.9	31	0.981	0.125	0.000	All parameters free by group	H3	none
M2	54.9	39	0.047	0.000	0.002	M1 + 1/2 size book effect if foreign language	H1	f < 0
M3	66.7	39	0.004	0.000	0.000	M1 + 1/2 size book effect if immigrant background	H2	g < 0
M4	34.7	39	0.666	0.007	0.017	M1 + equal book effect by language	H4	f = 0
M5	43.1	43	0.466	0.004	0.012	M1 + equal book effect by background	H4	g = 0
One Immigrant Parent (at least) / 8 groups								
M6	11.3	23	0.979	0.831	0.000	All parameters free by group	H3	none
M7	19.3	27	0.858	0.557	0.137	M6 + equal book effect by background	H4	f = 0; g = 0
M8	46.6	30	0.027	0.001	0.000	M7 + equal book effect all groups	H5	h = 0; i = 0
M9	28.2	29	0.507	0.240	0.030	M8 + book effect free for England	H5	h = 0; i = 0
Two Immigrant Parents / 12 groups								
M21	16.9	23	0.814	0.075	0.000	All parameters free by group	H3	none
M22	29.3	27	0.347	0.009	0.202	M21 + 1/2 size book effect if foreign language	H1	f < 0
M23	41.5	31	0.099	0.001	0.006	M21 + 1/2 size book effect if immigrant background	H2	g < 0
M24	19.1	27	0.866	0.183	0.727	M21 + equal book effect by language	H4	f = 0
M25	41.8	41	0.437	0.068	0.212	M21 + equal book effect by background	H4	g = 0
Two Immigrant Parents / 8 groups								
M26	6.2	8	0.628	0.336	0.000	All parameters free by group	H3	none
M27	25.6	12	0.012	0.012	0.005	M26 + equal book effect by background	H4	f = 0; g = 0
M28	64.7	15	0.000	0.000	0.000	M27 + equal book effect all groups	H5	h = 0; i = 0
M29	32.7	14	0.003	0.004	0.002	M28 + book effect free for Germany	H5	h = 0; i = 0
M30	28.5	16	0.028	0.040	0.029	M29 + equal standardized effects	H5	$h = 0; i = 0^c$
2 groups (Figures 2 & 3)								
M98	7.3	10	0.694	0.379	0.000	One parent immigrant (at least)	H3 & H5	
M99	12.0	10	0.286	0.101	0.000	Both parents immigrants	H3 & H5	

^aEstimator MLMV; exact("Exact_M") and "Equal" fit hypothesis tests' p-values (Kline 2015); The test modeling is as follows with test models(comparison model): M1(baseline), M2-M5(M1), M6(baseline), M7-M9(M6), M21(baseline), M22-M25(M21), M26(baseline), M27-M29(M26); Chi-square(X^2), df and "Exact_F" reported from FIML sensitivity models M11-M19 & M31-M39 in Appendix Table 4.

^bFor coefficients see Figs 2 and 3, and Table 5; READS intercepts equal across groups; case n in Appendix Table 7; 12 groups = 4 countries X 2 backgrounds (native or not) X 2 languages (native or not), excludes 4 groups of native background with foreign language spoken at home; 8 groups = 4 countries X 2 backgrounds; 2 groups = 2 backgrounds.

^cRelative zero given the different distributions by group

Technical Note : Table 3 uses MLMV and analogous models are tested in Table 4 with FIML. M1-M20 are with one-parent foreign-born and M21-M40 with two. Thus, e.g., M1=M11=M21=M31 structurally, and so forth. M1-M5 involve 16 groups, four groups within each country including native-born native-language speakers, native-born foreign-language speakers, immigrant native speakers and immigrant foreign-language speakers; M11-M15 are identical to M1-M5 except we drop the four groups of native-born foreign-language speakers due to collinearity of foreign-language and immigrant background as variables and grouping structure. The remaining models use only eight groups, native or immigrant in four countries. We focus on the results in M21-M40 because they offer the strictest tests of the scholarly culture hypothesis defining immigrants only as those with both parents born abroad.

FIGURES

Figure 1. Formal Model of the Theoretical Causes of Adolescent Language Aptitude

Figure 2. Structural Equation Estimates of Adolescent Language Aptitude.
CILS4EU Data; England, Germany, the Netherlands and Sweden.
Immigrants with both parents foreign-born.

Natives

Immigrants

NOTE: * $p < 0.001$, beta coefficients [standardized coefficients], α =intercept and θ =residual error variance. MLMV estimator, see Tables 2 and 5 for model statistics. Total N=15,704 (Natives=9,884).

APPENDIX

Table 1. Descriptive Statistics. CILS4EU data in England, Germany, The Netherlands and Sweden

variable	measure	label	n	mean	sd	min	max
---- Native ----							
LAN_TEST	scale of language aptitude test scores	LAN_TEST	11,103	16.85	4.89	0	30
BOOKS	nat. log continuous [books (c)], centered	BOOKS	10,256	4.42	1.27	2.53	6.62
Books (c)	continuous at midpoints, country centered	Books (c)	10,256	169	204	12.5	750
READS	continuous from "never"=1 to "every day" =5	READS	10,561	2.36	1.31	1	5.00
FGN_LANG	"always" or "often" non-native language spoken at home = 1	FGN_LANG	11,622	0.03	0.18	0	1
MOM_ED	for both mom and dad: "less than primary/ none/ unknown" =0, "primary" =1, "secondary" =2 and "tertiary" =3	MOM_ED	11,622	1.68	0.90	0	3
DAD_ED		DAD_ED	11,622	1.60	0.95	0	3
IMM_AGE		IMM_AGE	11,276	0.06	0.78	0	15
---- Immigrant, one parent ^a ----							
		LAN_TEST	7,238	13.79	5.37	0	30
		BOOKS	6,163	3.89	1.26	2.53	6.62
		Books (c)	6,163	111	168	12.5	750
		READS	6,444	2.46	1.31	1	5.00
		FGN_LANG	7,426	0.61	0.49	0	1
		MOM_ED	7,426	1.43	1.02	0	3
		DAD_ED	7,426	1.44	1.07	0	3
		IMM_AGE	7,315	1.84	3.81	0	15
---- Immigrant, both parents ^a ----							
		LAN_TEST	5,030	12.97	5.19	0	30
		BOOKS	4,189	3.71	1.20	2.53	6.62
		Books (c)	4,189	90	147	12.5	750
		READS	4,383	2.46	1.31	1	5.00
		FGN_LANG	5,152	0.73	0.44	0	1
		MOM_ED	5,152	1.34	1.03	0	3
		DAD_ED	5,152	1.39	1.07	0	3
		IMM_AGE	5,055	2.43	4.24	0	15

^aImmigrant coded as at least 'one parent' foreign-born or 'both parents' foreign-born. Total cases without missing on dependent variable: 18,341 overall and 15,704 with listwise deletion of missing on all variables in the table.

Figure 3. Structural Equation Estimates of Adolescent Language Aptitude.
CILS4EU Data; England, Germany, the Netherlands and Sweden.
Immigrants with at least one parent foreign-born.

Natives

Immigrants

NOTE: * $p < 0.001$, beta coefficients [standardized coefficients], α =intercept and θ =residual error variance. MLMV estimator, see Tables 2 and 5 for model statistics.

Figure 4. The Book Effect on Language Ability between Natives and Children of Two Immigrant Parents

Table 4. The Book Effect on Adolescent Language Aptitude. Table 3 Models Re-Specified with FIML. CILS4EU Data, England, Germany, the Netherlands and Sweden.

Chi-square tests ^a					Group Structure & Model Description ^b	Test ^d	Constraint (Figure 1)
Model	X ²	df	Exact	Equal			
One Immigrant Parent (at least) / 16 groups							
M11	16.4	31	0.986	n/a	All parameters free by group	H3	none
M12	55.1	39	0.045	n/a	M11 + 1/2 size book effect if foreign language	H1	f < 0
M13	64.0	39	0.007	n/a	M11 + 1/2 size book effect if immigrant background	H2	g < 0
M14	34.7	39	0.664	n/a	M11 + equal book effect by language	H4	f = 0
M15	43.3	43	0.456	n/a	M11 + equal book effect by background	H4	g = 0
One Immigrant Parent (at least) / 8 groups							
M16	11.1	23	0.983	n/a	All parameters free by group	H3	none
M17	19.4	27	0.857	n/a	M16 + equal book effect by background	H4	f = 0; g = 0
M18	55.8	30	0.003	n/a	M17 + equal book effect all groups	H5	h = 0; i = 0
M19	29.3	29	0.449	n/a	M18 + book effect free for England	H5	h = 0; i = 0
Two Immigrant Parents / 12 groups							
M31	16.9	23	0.814	n/a	All parameters free by group	H3	none
M32	29.3	27	0.347	n/a	M31 + 1/2 size book effect if foreign language	H1	f < 0
M33	41.5	31	0.099	n/a	M31 + 1/2 size book effect if immigrant background	H2	g < 0
M34	19.1	27	0.866	n/a	M31 + equal book effect by language	H4	f = 0
M35	41.8	41	0.437	n/a	M31 + equal book effect by background	H4	g = 0
Two Immigrant Parents / 8 groups							
M36	6.2	8	0.628	n/a	All parameters free by group	H3	none
M37	25.6	12	0.012	n/a	M36 + equal book effect by background	H4	f = 0; g = 0
M38	64.7	15	0.000	n/a	M37 + equal book effect all groups	H5	h = 0; i = 0
M39	32.7	14	0.003	n/a	M38 + book effect free for Germany	H5	h = 0; i = 0
M40	28.5	16	0.028	n/a	M39 + equal standardized effects	H5	h = 0; i = 0 ^c
2 groups (Figures 2 & 3)							
M980	7.3	10	0.694	n/a	One parent immigrant (at least)	H3 & H5	
M990	12.0	10	0.286	n/a	Both parents immigrants	H3 & H5	

^aEstimator FIML; Equal fit tests not possible; Exact fit tests reported in Tables 3 and 4 as substitutes.

^bREADS intercepts equal across groups; 12 groups = 4 countries X 2 backgrounds (native or not) X 2 languages (native or not), excludes 4 groups of native background with foreign language spoken at home; 8 groups = 4 countries X 2 backgrounds; 2 groups = 2 backgrounds.

^cZero after adjusting for the distributions (mean/variance) by group

Table 5. Metric (b) and Standardized (B) Coefficients for Selected Models from Table 3

Back gro und	Lan gu age	LAN_TEST ON										BOOKS ON								READS ON						Intercepts / Residual variance								
		BOOKS		MOM_ED		DAD_ED		READS		FGN_LANG		AGE_IMM		MOM_ED		DAD_ED		FGN_LANG		AGE_IMM		BOOKS		MOM_ED		DAD_ED		LAN_TEST		BOOKS		READS		
		b	B	b	B	b	B	b	B	b	B	b	B	b	B	b	B	b	B	b	B	b	B	b	B	b	B	b	var	b	var	b	var	
Model M1																																		
EN	Native	Nat.	0.49 *	0.22	0.09	0.08	0.52 *	0.16	0.19	0.08		-0.06	-0.02	0.19 *	0.39	0.33 *	0.23			0.00	0.00	0.01	0.01	0.47 *	0.96	-0.01	-0.01	17.2	7.5	0.08	1.33	0.00	0.12	
EN	Imm.	Nat.	0.41 *	0.17	-0.23	-0.19	0.54 *	0.17	0.72 †	0.30		-0.28 *	-0.28	0.15 *	0.31	0.31 *	0.24			-0.04 †	-0.10	0.02	0.01	0.49 *	0.96	0.00	0.00	17.2	8.5	-0.03	1.42	0.00	0.11	
EN	Native	Fgn. ^a	0.70 †	0.24	-0.96	-0.80	-0.57	-0.16	2.57	1.11		-1.06 *	-0.55	0.11	0.27	0.29	0.24			-0.12	-0.18	0.04	0.03	0.50 *	0.97	-0.05	-0.03	18.1	6.1	0.05	1.09	0.00	0.10	
EN	Imm.	Fgn.	0.44 *	0.16	-0.07	-0.05	0.38 †	0.11	0.45	0.17		-0.21 *	-0.30	0.14 *	0.28	0.40 *	0.31			-0.01	-0.02	0.00	0.00	0.49 *	0.96	0.01	0.00	17.0	10.9	-0.30	1.38	0.00	0.11	
DE	Native	Nat.	0.83 *	0.25	-0.12	-0.08	1.19 *	0.19	0.78 *	0.26		0.13	0.01	0.15 *	0.33	0.28 *	0.15			0.07 *	0.01	0.01	0.01	0.48 *	0.96	0.01	0.01	12.4	13.6	0.20	1.33	0.00	0.12	
DE	Imm.	Nat.	1.02 *	0.30	-0.62 †	-0.38	1.10 *	0.21	1.80 *	0.54		-0.30 *	-0.13	0.16 *	0.34	0.31 *	0.20			-0.02	-0.03	0.01	0.01	0.46 *	0.96	0.00	0.00	11.6	14.5	-0.15	1.33	0.00	0.12	
DE	Native	Fgn. ^a	1.67 *	0.54	-0.85	-0.52	1.43	0.23	1.53	0.46		-0.15	-0.03	0.21 †	0.40	0.34	0.17			-0.25 †	-0.12	0.00	0.00	0.47 *	0.96	0.09	0.05	10.5	11.5	-0.30	1.57	0.00	0.12	
DE	Imm.	Fgn.	0.74 *	0.22	-0.18	-0.12	1.10 *	0.25	0.47	0.15		-0.12 *	-0.10	0.13 *	0.29	0.25 *	0.19			-0.02 †	-0.06	0.02 †	0.02	0.46 *	0.96	0.02	0.01	9.9	13.3	-0.40	1.20	0.00	0.12	
NT	Native	Nat.	0.54 *	0.16	-0.15	-0.09	0.83 *	0.12	1.13 *	0.32		-0.22	-0.03	0.14 *	0.29	0.25 *	0.13			-0.03	-0.01	0.01 †	0.01	0.44 *	0.96	0.00	0.00	17.8	15.9	0.14	1.36	0.00	0.11	
NT	Imm.	Nat.	0.85 *	0.23	-0.06	-0.04	0.65 *	0.13	0.08	0.02		-0.33 *	-0.15	0.08 *	0.17	0.22 *	0.16			-0.03	-0.04	0.02	0.02	0.44 *	0.95	-0.02	-0.02	16.2	17.4	-0.12	1.37	0.00	0.11	
NT	Native	Fgn. ^a	1.29 *	0.35	0.26	0.15	0.69	0.10	0.26	0.07		-1.37	-0.10	0.18 *	0.38	0.55 †	0.28			-0.25	-0.07	0.02	0.02	0.46 *	0.95	0.10 †	0.05	17.4	15.4	-0.04	1.18	0.00	0.11	
NT	Imm.	Fgn.	0.92 *	0.24	-0.35	-0.21	0.64 *	0.14	0.63	0.17		-0.26 *	-0.19	0.11 *	0.25	0.26 *	0.22			-0.01	-0.02	0.02	0.02	0.44 *	0.96	0.00	0.00	14.5	16.6	-0.45	1.13	0.00	0.11	
SE	Native	Nat.	0.71 *	0.19	0.42 *	0.25	0.32 *	0.08	-0.05	-0.01		-0.78 †	-0.07	0.14 *	0.31	0.15 *	0.13			-0.02	-0.01	0.01	0.01	0.48 *	0.96	0.00	0.00	19.9	16.8	0.29	1.23	0.00	0.12	
SE	Imm.	Nat.	0.84 *	0.22	0.03	0.02	0.56 *	0.13	0.33	0.09		-0.47 *	-0.23	0.12 *	0.24	0.14 †	0.12			-0.06 †	-0.11	-0.01	-0.01	0.48 *	0.97	0.02	0.01	18.7	20.8	-0.13	1.51	0.00	0.12	
SE	Native	Fgn. ^a	1.46 *	0.41	-0.14	-0.07	-0.13	-0.03	0.99	0.24		-0.17	-0.13	0.12	0.22	0.14	0.12			-0.06	-0.18	0.03	0.04	0.46 *	0.96	0.02	0.02	17.6	20.3	0.14	1.89	0.00	0.10	
SE	Imm.	Fgn.	0.44 *	0.11	0.34	0.20	0.45 *	0.11	-0.33	-0.09		-0.24 *	-0.22	0.09 *	0.19	0.21 *	0.19			-0.01	-0.05	0.01	0.01	0.50 *	0.97	0.00	0.00	17.1	20.9	-0.63	1.37	0.00	0.11	
Model M6																																		
EN	Native		0.50 *	0.22	0.07	0.07	0.52 *	0.15	0.22	0.10	0.49	0.02	-0.13	-0.04	0.19 *	0.39	0.34 *	0.23	-0.16	-0.02	-0.01	-0.01	0.01	0.01	0.47 *	0.97	-0.01	-0.01	17.2	7.5	0.08	1.33	0.00	0.12
EN	Imm.		0.43 *	0.17	-0.16	-0.12	0.47 *	0.14	0.59 †	0.23	-0.07	-0.01	-0.24 *	-0.30	0.14 *	0.29	0.36 *	0.28	-0.21 †	-0.08	-0.02	-0.05	0.01	0.01	0.49 *	0.97	0.00	0.00	17.2	9.6	-0.07	1.41	0.00	0.11
DE	Native		0.85 *	0.26	-0.14	-0.09	1.20 *	0.19	0.80 *	0.27	-2.12 *	-0.07	0.02	0.00	0.15 *	0.33	0.29 *	0.15	-0.54 †	-0.06	0.02	0.00	0.01	0.01	0.48 *	0.96	0.01	0.01	12.4	13.6	0.20	1.33	0.00	0.12
DE	Imm.		0.84 *	0.24	-0.30 †	-0.19	1.09 *	0.22	0.85 *	0.26	-1.46 *	-0.16	-0.14 *	-0.10	0.14 *	0.30	0.26 *	0.19	-0.24 *	-0.09	-0.02 †	-0.06	0.02 †	0.02	0.46 *	0.96	0.01	0.01	11.4	13.9	0.02	1.24	0.00	0.12
NT	Native		0.57 *	0.16	-0.13	-0.08	0.82 *	0.12	1.10 *	0.31	-0.37	-0.02	-0.24	-0.03	0.14 *	0.30	0.27 *	0.14	-0.13	-0.02	-0.03	-0.01	0.01 †	0.02	0.44 *	0.96	0.00	0.00	17.8	15.9	0.13	1.36	0.00	0.11
NT	Imm.		0.89 *	0.23	-0.22	-0.12	0.65 *	0.13	0.37	0.10	-1.72 *	-0.19	-0.28 *	-0.16	0.10 *	0.21	0.24 *	0.19	-0.32 *	-0.13	-0.01	-0.03	0.02 †	0.02	0.44 *	0.96	-0.01	-0.01	16.2	17.0	-0.13	1.24	0.00	0.11
SE	Native		0.73 *	0.20	0.41 *	0.24	0.31 *	0.07	-0.04	-0.01	-1.73 †	-0.05	-0.41 †	-0.07	0.14 *	0.31	0.15 *	0.13	-0.18	-0.02	-0.05	-0.03	0.01	0.01	0.48 *	0.96	0.00	0.00	19.9	16.9	0.29	1.24	0.00	0.12
SE	Imm.		0.61 *	0.16	0.25	0.13	0.49 *	0.11	-0.08	-0.02	-1.20 *	-0.12	-0.28 *	-0.21	0.10 *	0.21	0.18 *	0.16	-0.46 *	-0.18	-0.02 †	-0.06	0.00	0.00	0.49 *	0.97	0.01	0.01	18.6	21.0	-0.16	1.43	0.00	0.12
Model M8																																		
EN	Native		0.64 *	0.28	0.05	0.05	0.47 *	0.14	0.21	0.09	0.52	0.02	-0.13	-0.03	0.19 *	0.39	0.34 *	0.23	-0.16	-0.02	-0.01	-0.01	0.01	0.01	0.47 *	0.97	-0.01	-0.01	17.2	7.5	0.08	1.33	0.00	0.12
EN	Imm.		0.64 *	0.24	-0.18	-0.14	0.40 *	0.12	0.57 †	0.22	-0.02	0.00	-0.23 *	-0.29	0.14 *	0.29	0.36 *	0.28	-0.21 †	-0.08	-0.02	-0.05	0.01	0.01	0.49 *	0.97	0.00	0.00	17.2	9.7	-0.07	1.41	0.00	0.11
DE	Native		0.64 *	0.20	-0.12	-0.08	1.26 *	0.20	0.82 *	0.28	-2.23 *	-0.08	0.03	0.00	0.15 *	0.33	0.29 *	0.15	-0.54 †	-0.06	0.02	0.00	0.01	0.01	0.48 *	0.96	0.01	0.01	12.4	13.7	0.20	1.33	0.00	0.12
DE	Imm.		0.64 *	0.19	-0.29 †	-0.18	1.14 *	0.24	0.88 *	0.27	-1.50 *	-0.17	-0.15 *	-0.11	0.14 *	0.30	0.26 *	0.19	-0.24 *	-0.09	-0.02 †	-0.06	0.02 †	0.02	0.46 *	0.96	0.01	0.01	11.4	13.9	-0.15	1.24	0.00	0.12
NT	Native		0.64 *	0.19	-0.14	-0.08	0.80 *	0.12	1.09 *	0.30	-0.36	-0.02	-0.24 †	-0.03	0.14 *	0.30	0.27 *	0.14	-0.13	-0.02	-0.03	-0.01	0.01 †	0.02	0.44 *	0.96	0.00	0.00	17.7	15.9	0.13	1.36	0.00	0.11
NT	Imm.		0.64 *	0.17	-0.21	-0.12	0.71 *	0.15	0.42	0.11	-1.80 *	-0.20	-0.28 *	-0.17	0.10 *	0.21	0.24 *	0.19	-0.32 *	-0.13	-0.01	-0.03	0.02 †	0.02	0.44 *	0.96	-0.01	-0.01	16.2	17.1	-0.13	1.24	0.00	0.11
SE	Native		0.64 *	0.17	0.42 *	0.25	0.32 *	0.08	-0.02	-0.01	-1.75 †	-0.05	-0.42 †	-0.07	0.14 *	0.31	0.15 *	0.13	-0.18	-0.02	-0.05	-0.03	0.01	0.01	0.48 *	0.96	0.00	0.00	19.9	16.9	0.29	1.24	0.00	0.12
SE	Imm.		0.64 *	0.16	0.24	0.13	0.49 *	0.11	-0.08	-0.02	-1.19 *	-0.12	-0.28 *	-0.21	0.10 *	0.21	0.18 *	0.16	-0.46 *	-0.18	-0.02 †	-0.06	0.00	0.00	0.49 *	0.97	0.01	0.01	18.6	21.0	-0.16	1.43	0.00	0.12

Table 5 continued.

Back gro und	Lan gu age	LAN_TEST ON												BOOKS ON								READS ON						Intercepts / Residual variance					
		BOOKS		MOM_ED		DAD_ED		READS		FGN_LANG		AGE_IMM		MOM_ED		DAD_ED		FGN_LANG		AGE_IMM		BOOKS		MOM_ED		DAD_ED		LAN_TEST		BOOKS		READS	
		b	B	b	B	b	B	b	B	b	B	b	B	b	B	b	B	b	B	b	B	b	B	b	B	b	B	b	B	b	var	b	var
Model M9																																	
EN	Native	0.48 *	0.21	0.08	0.07	0.52 *	0.16	0.22	0.10	0.49	0.02	-0.13	-0.04	0.19 *	0.39	0.34 *	0.23	-0.16	-0.02	-0.01	-0.01	0.01	0.01	0.47 *	0.97	-0.01	-0.01	17.2	7.5	0.08	1.33	0.00	0.12
EN	Imm.	0.48 *	0.18	-0.16	-0.12	0.46 *	0.14	0.59 †	0.23	-0.06	-0.01	-0.24 *	-0.29	0.14 *	0.29	0.36 *	0.28	-0.21 †	-0.08	-0.02	-0.05	0.01	0.01	0.49 *	0.97	0.00	0.00	17.2	9.7	-0.07	1.41	0.00	0.11
DE	Native	0.74 *	0.23	-0.13	-0.09	1.23 *	0.20	0.81 *	0.27	-2.18 *	-0.08	0.02	0.00	0.15 *	0.33	0.29 *	0.15	-0.54 †	-0.06	0.02	0.00	0.01	0.01	0.48 *	0.96	0.01	0.01	12.4	13.6	0.20	1.33	0.00	0.12
DE	Imm.	0.74 *	0.21	-0.29 †	-0.19	1.11 *	0.23	0.86 *	0.27	-1.48 *	-0.16	-0.15 *	-0.10	0.14 *	0.30	0.26 *	0.19	-0.24 *	-0.09	-0.02 †	-0.06	0.02 †		0.46 *		0.01		11.4	13.9	-0.15	1.24	0.00	0.12
NT	Native	0.74 *	0.21	-0.14	-0.09	0.78 *	0.11	1.07 *	0.30	-0.34	-0.02	-0.24	-0.03	0.14 *	0.30	0.27 *	0.14	-0.13	-0.02	-0.03	-0.01	0.01 †	0.02	0.44 *	0.96	0.00	0.00	17.7	15.9	0.13	1.36	0.00	0.11
NT	Imm.	0.74 *	0.19	-0.21	-0.12	0.68 *	0.14	0.40	0.10	-1.77 *	-0.19	-0.28 *	-0.17	0.10 *	0.21	0.24 *	0.19	-0.32 *	-0.13	-0.01	-0.03	0.02 †	0.02	0.44 *	0.96	-0.01	-0.01	16.2	17.0	-0.13	1.24	0.00	0.11
SE	Native	0.74 *	0.20	0.41 *	0.24	0.31 *	0.07	-0.04	-0.01	-1.73 †	-0.05	-0.41 †	-0.07	0.14 *	0.31	0.15 *	0.13	-0.18	-0.02	-0.05	-0.03	0.01	0.01	0.48 *	0.96	0.00	0.00	19.9	16.9	0.29	1.24	0.00	0.12
SE	Imm.	0.74 *	0.19	0.23	0.12	0.47 *	0.11	-0.08	-0.02	-1.15 *	-0.11	-0.28 *	-0.21	0.10 *	0.21	0.18 *	0.16	-0.46 *	-0.18	-0.02 †	-0.06	0.00	0.00	0.49 *	0.97	0.01	0.01	18.6	21.1	-0.16	1.43	0.00	0.11
Model M25																																	
EN	Native	Nat.	0.48 *	0.21	0.02	0.02	0.53 *	0.16	0.30	0.14		-0.14	-0.04	0.18 *	0.38	0.34 *	0.23		-0.02	-0.01		0.01 *	0.01	0.47 *	0.96	-0.01	-0.01	17.2	7.5	0.08	1.36	-0.01	0.12
EN	Imm.	Nat.	0.48 *	0.17	0.02	0.01	0.48 †	0.15	0.18	0.07		-0.30 *	-0.37	0.17 *	0.34	0.24 *	0.20		-0.03	-0.10		0.01 *	0.01	0.50 *	0.96	0.01	0.00	17.4	9.3	-0.17	1.29	-0.01	0.11
EN	Imm.	Fgn.	0.48 *	0.17	-0.05	-0.04	0.34	0.09	0.43	0.16		-0.20 *	-0.28	0.13 *	0.25	0.36 *	0.29		0.01	0.02		0.01 *	0.01	0.49 *	0.96	0.00	0.00	16.9	12.1	-0.39	1.44	-0.01	0.11
DE	Native	Nat.	0.81 *	0.25	-0.17	-0.11	1.20 *	0.20	0.89 *	0.29		-0.12	-0.01	0.15 *	0.34	0.30 *	0.16		-0.01	-0.01		0.01 *	0.01	0.48 *	0.96	0.01	0.01	12.3	13.6	0.17	1.33	-0.01	0.12
DE	Imm.	Nat.	0.81 *	0.23	-0.59	-0.35	1.05 *	0.21	1.71 †	0.49		-0.26 *	-0.15	0.13 *	0.27	0.19 †	0.13		0.00	0.00		0.01 *	0.01	0.45 *	0.96	-0.03	-0.02	10.9	15.4	-0.34	1.36	-0.01	0.12
DE	Imm.	Fgn.	0.81 *	0.24	-0.23	-0.16	0.88 *	0.21	0.53	0.18		-0.10 *	-0.09	0.13 *	0.29	0.22 *	0.17		-0.02	-0.06		0.01 *	0.01	0.46 *	0.96	0.02	0.02	9.8	12.8	-0.44	1.15	-0.01	0.12
NT	Native	Nat.	0.60 *	0.17	-0.15	-0.09	0.77 *	0.12	1.05 *	0.29		-0.28 †	-0.04	0.14 *	0.29	0.24 *	0.13		-0.02	-0.01		0.01 *	0.01	0.44 *	0.96	0.00	0.00	17.7	16.2	0.13	1.36	-0.01	0.11
NT	Imm.	Nat.	0.60 *	0.17	0.00	0.00	0.33	0.08	-0.04	-0.01		-0.23 †	-0.13	0.04	0.09	0.11	0.09		0.00	-0.01		0.01 *	0.01	0.45 *	0.96	-0.03	-0.02	15.1	15.6	-0.40	1.32	-0.01	0.12
NT	Imm.	Fgn.	0.60 *	0.15	-0.39	-0.24	0.57 *	0.13	0.63	0.18		-0.26 *	-0.20	0.10 *	0.24	0.20 *	0.17		0.00	0.00		0.01 *	0.01	0.44 *	0.96	0.00	0.00	14.1	15.9	-0.57	1.01	-0.01	0.11
SE	Native	Nat.	0.60 *	0.16	0.36 †	0.21	0.33 *	0.08	0.11	0.03		-0.59 †	-0.07	0.15 *	0.32	0.15 *	0.13		-0.04	-0.02		0.01 *	0.01	0.48 *	0.96	0.00	0.00	19.9	16.9	0.27	1.24	-0.01	0.12
SE	Imm.	Nat.	0.60 *	0.16	-0.15	-0.09	0.41	0.10	0.36	0.10		-0.32 *	-0.22	0.05	0.11	0.04	0.04		-0.02	-0.05		0.01 *	0.01	0.48 *	0.97	0.00	0.00	16.9	20.4	-0.55	1.55	-0.01	0.11
SE	Imm.	Fgn.	0.60 *	0.15	0.32	0.17	0.40 *	0.09	-0.30	-0.08		-0.22 *	-0.21	0.09 *	0.20	0.21 *	0.20		-0.01	-0.05		0.01 *	0.01	0.50 *	0.97	0.00	0.00	17.0	20.7	-0.71	1.25	-0.01	0.11
Model M26																																	
EN	Native		0.51 *	0.22	0.00	0.00	0.51 *	0.16	0.34 †	0.15		-0.18 †	-0.06	0.18 *	0.37	0.36 *	0.25		-0.04	-0.03		0.01	0.01	0.47 *	0.97	-0.01	-0.01	17.2	7.5	0.07	1.35	0.00	0.12
EN	Imm.		0.37 *	0.13	-0.01	-0.01	0.47	0.14	0.32	0.12		-0.24	-0.33	0.14 *	0.28	0.33 *	0.27		-0.01	-0.03		0.00	0.00	0.49 *	0.97	0.01	0.01	17.1	11.0	-0.30	1.39	-0.02	0.11
DE	Native		0.96 *	0.29	-0.22 †	-0.14	1.33 *	0.21	0.92 *	0.29		-0.42 *	-0.07	0.15 *	0.33	0.32 *	0.18		-0.06 †	-0.03		0.01	0.01	0.48 *	0.96	0.01	0.01	12.1	14.1	0.12	1.35	0.00	0.12
DE	Imm.		0.66 *	0.20	-0.27	-0.18	0.96 *	0.22	0.71 †	0.23		-0.13 *	-0.11	0.13 *	0.29	0.22 *	0.17		-0.02	-0.05		0.02	0.02	0.46 *	0.96	0.01	0.01	10.0	13.4	-0.42	1.20	-0.01	0.12
NT	Native		0.59 *	0.17	-0.10	-0.06	0.83 *	0.13	0.96 *	0.27		-0.39 *	-0.07	0.14 *	0.30	0.26 *	0.14		-0.02	-0.01		0.01	0.01	0.44 *	0.96	0.00	0.00	17.6	16.4	0.12	1.36	0.00	0.11
NT	Imm.		0.87 *	0.23	-0.27	-0.16	0.47 †	0.11	0.40	0.11		-0.26 *	-0.18	0.08 *	0.19	0.18 *	0.16		0.00	-0.01		0.02	0.01	0.44 *	0.96	-0.02	-0.01	14.6	16.0	-0.51	1.13	-0.02	0.12
SE	Native		0.70 *	0.19	0.37 *	0.21	0.31 *	0.07	0.05	0.01		-0.47 *	-0.11	0.14 *	0.30	0.15 *	0.13		-0.04	-0.03		0.01 †	0.01	0.48 *	0.96	0.01	0.00	19.8	17.3	0.25	1.29	-0.01	0.12
SE	Imm.		0.42 *	0.11	0.19	0.11	0.44 *	0.10	-0.09	-0.03		-0.24 *	-0.21	0.08 *	0.17	0.16 *	0.15		-0.02	-0.06		0.01	0.00	0.49 *	0.97	0.00	0.00	16.9	20.7	-0.65	1.34	0.01	0.11

Table 5 continued.

Back gro und	Lan gu age	LAN_TEST ON								BOOKS ON				READS ON				Intercepts / Residual variance														
		BOOKS		MOM_ED		DAD_ED		READS		FGN_LANG		AGE_IMM		BOOKS		MOM_ED		DAD_ED		LAN_TEST		BOOKS		READS								
		b	B	b	B	b	B	b	B	b	B	b	B	b	B	b	B	b	B	b	var	b	var	b	var							
Model M28																																
EN	Native	0.64 *	0.28	-0.03		-0.01	0.46 *	0.14	0.33 †	0.15		-0.17 †	-0.06	0.18 *	0.37	0.36 *	0.25		-0.04	-0.03	0.01	0.01	0.47 *	0.97	-0.01	-0.01	17.2	7.5	0.07	1.35	0.00	0.12
EN	Imm.	0.64 *	0.22	-0.05		-0.03	0.38 *	0.11	0.33	0.12		-0.24 *	-0.32	0.14 *	0.28	0.33 *	0.27		-0.01	-0.03	0.00	0.00	0.49 *	0.97	0.01	0.01	17.2	11.1	-0.30	1.39	-0.02	0.11
DE	Native	0.64 *	0.19	-0.19		-0.12	1.43 *	0.23	0.95 *	0.31		-0.44 *	-0.08	0.15 *	0.33	0.32 *	0.18		-0.06 †	-0.03	0.01	0.01	0.48 *	0.96	0.01	0.01	12.1	14.3	0.12	1.35	0.00	0.12
DE	Imm.	0.64 *	0.19	-0.27		-0.18	0.96 *	0.22	0.72 †	0.23		-0.13 *	-0.11	0.13 *	0.29	0.22 *	0.17		-0.02	-0.05	0.02	0.02	0.46 *	0.96	0.01	0.01	10.0	13.4	-0.42	1.20	-0.01	0.12
NT	Native	0.64 *	0.18	-0.10		-0.06	0.82 *	0.12	0.95 *	0.26		-0.39 *	-0.07	0.14 *	0.30	0.26 *	0.14		-0.02	-0.01	0.01	0.01	0.44 *	0.96	0.00	0.00	17.6	16.5	0.12	1.36	0.00	0.11
NT	Imm.	0.64 *	0.17	-0.27		-0.16	0.52 *	0.12	0.43	0.12		-0.26 *	-0.19	0.08 *	0.19	0.18 *	0.16		0.00	-0.01	0.02	0.01	0.44 *	0.96	-0.02	-0.01	14.5	16.1	-0.51	1.13	-0.02	0.12
SE	Native	0.64 *	0.17	0.37 *		0.22	0.32 *	0.07	0.06	0.02		-0.47 *	-0.11	0.14 *	0.30	0.15 *	0.13		-0.04	-0.03	0.01	0.01	0.48 *	0.96	0.01	0.00	19.8	17.4	0.25	1.29	-0.01	0.12
SE	Imm.	0.64 *	0.16	0.18		0.10	0.40	0.10	-0.10	-0.03		-0.23 *	-0.21	0.08 *	0.17	0.16 *	0.15		-0.02	-0.06	0.01	0.00	0.49 *	0.97	0.00	0.00	17.1	20.7	-0.65	1.34	0.01	0.11
Model M29																																
EN	Native	0.56 *	0.25	-0.01		-0.01	0.49 *	0.15	0.33 †	0.15		-0.18 †	-0.06	0.18 *	0.37	0.36 *	0.25		-0.04	-0.03	0.01	0.01	0.47 *	0.97	-0.01	-0.01	17.2	7.5	0.07	1.35	0.00	0.12
EN	Imm.	0.56 *	0.20	-0.04		-0.03	0.41 *	0.12	0.33	0.12		-0.24 *	-0.32	0.14 *	0.28	0.33 *	0.27		-0.01	-0.03	0.00	0.00	0.49 *	0.97	0.01	0.01	17.2	11.1	-0.30	1.39	-0.02	0.11
DE	Native	0.88 *	0.26	-0.21 †		-0.14	1.36 *	0.22	0.93 *	0.30		-0.43 *	-0.07	0.15 *	0.33	0.32 *	0.18		-0.06 †	-0.03	0.01	0.01	0.48 *	0.96	0.01	0.01	12.1	14.1	0.12	1.35	0.00	0.12
DE	Imm.	0.88 *	0.26	-0.28 †		-0.19	0.91 *	0.20	0.68 †	0.22		-0.12 *	-0.10	0.13 *	0.29	0.22 *	0.17		-0.02	-0.05	0.02	0.02	0.46 *	0.96	0.01	0.01	10.1	13.5	-0.42	1.20	-0.01	0.12
NT	Native	0.56 *	0.16	-0.10		-0.06	0.84 *	0.13	0.97 *	0.27		-0.39 *	-0.07	0.14 †	0.30	0.26 *	0.14		-0.02	-0.01	0.01 †	0.01	0.44 *	0.96	0.00	0.00	17.6	16.4	0.44	1.36	0.00	0.11
NT	Imm.	0.56 *	0.15	-0.26		-0.16	0.53 *	0.12	0.44	0.13		-0.26 *	-0.19	0.08 *	0.19	0.18 *	0.16		0.00	-0.01	0.02	0.01	0.44 *	0.96	-0.02	-0.01	14.4	16.1	-0.51	1.13	-0.02	0.12
SE	Native	0.56 *	0.15	0.38 *		0.22	0.33 *	0.08	0.07	0.02		-0.48 *	-0.11	0.14 *	0.30	0.15 *	0.13		-0.04	-0.03	0.01 †	0.01	0.48 *	0.96	0.01	0.00	19.8	17.4	0.25	1.29	-0.01	0.12
SE	Imm.	0.56 *	0.14	0.19		0.10	0.41 *	0.10	-0.10	-0.03		-0.24 *	-0.21	0.08 *	0.17	0.16 *	0.15		-0.02	-0.06	0.01	0.00	0.49 *	0.97	0.00	0.00	17.0	20.7	-0.65	1.34	0.01	0.11
Model M30																																
EN	Native	0.49 ^b	0.22	0.00		0.00	0.52 *	0.16	0.34 †	0.15		-0.18 †	-0.06	0.18 *	0.37	0.36 *	0.25		-0.04	-0.03	0.01	0.01	0.47 *	0.97	-0.01	-0.01	17.2	7.5	0.07	1.35	0.00	0.12
EN	Imm.	0.53 ^b	0.19	-0.03		-0.02	0.42 *	0.12	0.32	0.12		-0.24 *	-0.32	0.14 *	0.28	0.33 *	0.27		-0.01	-0.03	0.00	0.00	0.49 *	0.97	0.01	0.01	17.2	11.0	-0.30	1.39	-0.02	0.11
DE	Native	0.83 ^b	0.25	-0.21 †		-0.13	1.37 *	0.22	0.93 *	0.30		-0.43 *	-0.07	0.15 *	0.33	0.32 *	0.18		-0.06 †	-0.03	0.01	0.01	0.48 *	0.96	0.01	0.01	12.1	14.1	0.12	1.35	0.00	0.12
DE	Imm.	0.71 ^b	0.21	-0.27		-0.18	0.95 *	0.21	0.71 †	0.23		-0.13 *	-0.11	0.13 *	0.29	0.22 *	0.17		-0.02	-0.05	0.02	0.02	0.46 *	0.96	0.01	0.01	10.0	13.4	-0.42	1.20	-0.01	0.12
NT	Native	0.71 ^b	0.20	-0.11		-0.06	0.80 *	0.12	0.94 *	0.26		-0.39 *	-0.07	0.14 *	0.30	0.26 *	0.14		-0.02	-0.01	0.01 †	0.01	0.44 *	0.96	0.00	0.00	17.6	16.5	0.12	1.36	0.00	0.12
NT	Imm.	0.80 ^b	0.21	-0.27		-0.16	0.49 *	0.11	0.41	0.12		-0.26 *	-0.19	0.08 *	0.19	0.18 *	0.16		-0.00	-0.01	0.02	0.01	0.44 *	0.96	-0.02	-0.01	14.6	16.0	-0.51	1.13	-0.02	0.12
SE	Native	0.75 ^b	0.20	0.36 †		0.21	0.30 *	0.07	0.04	0.01		-0.47 *	-0.11	0.14 *	0.30	0.15*	0.13		-0.04	-0.03	0.01 †	0.01	0.48 *	0.96	0.01	0.00	19.8	17.3	0.25	1.29	-0.01	0.12
SE	Imm.	0.73 ^b	0.18	0.18		0.10	0.39 †	0.09	-0.11	-0.03		-0.23 *	-0.21	0.08 *	0.17	0.16 *	0.15		-0.02	-0.06	0.01	0.00	0.49 *	0.97	0.00	0.00	17.1	20.8	-0.65	1.34	0.01	0.11
Model M98 ^c																																
	Native	0.69 *	0.18	0.04		0.02	0.59 *	0.10	0.52 *	0.14		-0.29 *	-0.04	0.15 *	0.33	0.25 *	0.16		-0.03	-0.02	0.01 *	0.01	0.46 *	0.96	0.00	0.00	17.2	13.9	0.08	1.33	0.00	0.12
	Imm.	0.69 *	0.16	-0.14		-0.07	0.72 *	0.14	0.50 *	0.12		-0.26 *	-0.17	0.12 *	0.25	0.27 *	0.22		-0.03 *	-0.08	0.01 †	0.01	0.47 *	0.96	0.01	0.00	17.2	16.2	-0.12	1.36	0.00	0.12
Model M99 ^c																																
	Native	0.66 *	0.17	0.01		0.01	0.63 *	0.11	0.57 *	0.15		-0.36 *	-0.07	0.15 *	0.33	0.26 *	0.17		-0.04 †	-0.02	0.01 *	0.01	0.47 *	0.96	0.00	0.00	17.2	14.2	0.07	1.34	0.00	0.12
	Imm.	0.66 *	0.15	-0.14		-0.07	0.56 *	0.11	0.42 †	0.11		-0.21 *	-0.16	0.11 *	0.24	0.22 *	0.18		-0.01 †	-0.04	0.01	0.01	0.47 *	0.96	0.00	0.00	17.1	15.7	-0.26	1.27	0.00	0.12

NOTE: *p<=.001,†p<=.050

^aToo few cases for reliable analysis^bFixed parameters within each country have no standard errors.^cPooled models, including dummy country variables (EN reference): M98 Natives Lan_test ON DE -4.67*, NT 0.54*, SE 2.57*; Books ON DE 0.12*, NT 0.05, SE 0.18*. M98 Immigrants Lan_test ON DE -6.75*, NT -2.03*, SE 0.63*; Books ON DE -0.20*, NT -0.16*, SE -0.31*. M99 Natives Lan_test ON DE -0.43*, NT 0.04*, SE 0.22*; Books ON DE 0.02, NT 0.02, SE 0.05* Immigrants Lan_test ON DE -0.65*, NT -0.21*, SE -0.01; Books ON DE -0.07*, NT -0.08*, SE -0.15*.

Table 6. Fit Statistics to supplement Tables 3 and 4.

<i>Table 3</i>								<i>Table 4</i>							
<i>Models</i>	RMSEA	CFI	TLI	AIC	BIC	SRMR	WRMR	<i>Models</i>	RMSEA	CFI	TLI	AIC	BIC	SRMR	
M1	0.017*	1.000	0.999	145548.2	147517.3	0.002	0.077	M11	0.000*	1.000	1.002	152068.8	154056.8	0.002	
M2	0.039	0.999	0.994	145572.5	147480.3	0.008	0.223	M12	0.020*	1.000	0.998	152091.5	154017.7	0.009	
M3	0.041	0.999	0.993	145579.6	147487.4	0.010	0.332	M13	0.025*	1.000	0.998	152100.4	154026.6	0.010	
M4	0.026*	0.999	0.997	145551.1	147458.8	0.006	0.178	M14	0.000*	1.000	1.000	152071.1	153997.3	0.007	
M5	0.026*	0.999	0.997	145551.4	147428.0	0.007	0.282	M15	0.003*	1.000	1.000	152071.7	153967.0	0.008	
M6	0.000*	1.000	1.001	145500.4	146611.3	0.001	0.071	M16	0.000*	1.000	1.001	152037.5	153159.1	0.001	
M7	0.000*	1.000	1.000	145500.4	146580.7	0.004	0.204	M17	0.000*	1.000	1.001	152037.7	153128.5	0.004	
M8	0.023*	0.999	0.997	145526.9	146584.2	0.008	0.440	M18	0.020*	0.999	0.998	152068.2	153135.7	0.010	
M9	0.009*	1.000	1.000	145504.2	146569.2	0.005	0.329	M19	0.002*	1.000	1.000	152043.7	153118.9	0.006	
M21	0.019*	1.000	0.999	137562.1	139030.4	0.002	0.101	M31	0.000*	1.000	1.000	143142.9	144624.5	0.002	
M22	0.025*	1.000	0.988	137566.8	139004.7	0.006	0.188	M32	0.008*	1.000	1.000	143147.3	144598.2	0.006	
M23	0.028*	0.999	0.997	137571.4	138978.9	0.008	0.270	M33	0.016*	1.000	0.999	143151.5	144571.7	0.008	
M24	0.014*	1.000	0.999	137556.4	138994.4	0.003	0.119	M34	0.000*	1.000	1.001	143137.1	144588.0	0.003	
M25	0.017*	1.000	0.999	137550.2	138881.6	0.006	0.269	M35	0.004*	1.000	1.000	143131.8	144475.2	0.007	
M26	0.008*	1.000	1.000	145444.4	146486.3	0.001	0.074	M36	0.000*	1.000	1.000	151959.2	153011.2	0.001	
M27	0.024*	1.000	0.998	145453.2	146464.5	0.006	0.316	M37	0.023*	1.000	0.998	151970.7	152991.8	0.007	
M28	0.039	0.999	0.994	145483.1	146471.4	0.010	0.644	M38	0.040	0.999	0.994	152003.8	153001.7	0.013	
M29	0.026*	1.000	0.997	145456.0	146452.0	0.007	0.373	M39	0.025*	1.000	0.997	151973.7	152979.3	0.009	
M30	0.019*	1.000	0.999	145447.6	146428.3	0.006	0.385	M40	0.019*	1.000	0.999	151965.5	152955.7	0.008	
M98	0.003*	1.000	1.000	146871.8	147208.9	0.002	0.196	M980	0.000*	1.000	1.000	153426.9	153767.3	0.002	
M99	0.009*	1.000	1.000	146595.1	146932.2	0.002	0.210	M990	0.005*	1.000	1.000	153087.0	153427.4	0.002	

NOTE: *p-close value>0.99

Table 7. Multigroup Sample Size

<u>Grouping Criteria</u>			<u>16 Groups</u>		<u>8 Groups</u>	
Country	Background	Language	One	Both	One	Both
England	Native	No Fgn_lang	2,256	2,626	2,297	2,787
England	Native	Fgn_lang	41	161		
Germany	Native	No Fgn_lang	2,350	2,619	2,399	2,881
Germany	Native	Fgn_lang	49	262		
Sweden	Native	No Fgn_lang	2,304	2,649	2,344	2,815
Sweden	Native	Fgn_lang	40	166		
The Netherlands	Native	No Fgn_lang	2,720	3,017	2,844	3,246
The Netherlands	Native	Fgn_lang	124	229		
England	Immigrant	No Fgn_lang	677	307	1,253	763
England	Immigrant	Fgn_lang	576	456		
Germany	Immigrant	No Fgn_lang	556	242	1,805	1,278
Germany	Immigrant	Fgn_lang	1,249	1,036		
Sweden	Immigrant	No Fgn_lang	616	271	1,591	1,120
Sweden	Immigrant	Fgn_lang	975	849		
The Netherlands	Immigrant	No Fgn_lang	569	272	1,216	814
The Netherlands	Immigrant	Fgn_lang	647	542		
Total nonmissing			15,704	15,704	15,704	15,704
Missing			2,637	2,637	2,637	2,637
Total sample size			18,341	18,341	18,341	18,341

NOTE: "One" immigrant defined as at least one foreign-born parent while native have two native born parents;
 "Both" immigrant defined as both foreign-born parents while native has at least one native-born parent; "Fgn_lang"
 refers to those speaking a language other than the native country language in the adolescent home.

Figure 5. The Book Effect on Language Ability between Natives and Children of at least One Immigrant Parent