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Maternal Employment and Adolescents' Educational Achievement: A Look at the Children of Immigrants

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## Abstract

### Maternal Employment and Adolescents' Educational Achievement: A Look at the Children of Immigrants

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Using data from the Education Longitudinal Study of 2002, this paper examines the relationship between maternal employment and the academic achievement of tenth grade students, with a particular focus on how this relationship differs between the children of U.S. natives and the children of immigrants. Maternal employment brings additional income to the household, which can have beneficial effects on child outcomes. However, employment also reduces the amount of time a mother can spend at home with her children. This study finds that full time maternal employment does not have any significant effect on the academic achievement of second-generation immigrants, but has a small negative impact on GPA and standardized reading scores for the children of U.S. natives. These differences in the effect of maternal employment may occur because of differences in attitudes, preferences and time use between immigrant and native parents.

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## Table of Contents

I. Introduction .....	1
II. Literature Review .....	5
III. Theoretical Framework.....	8
IV. Data and Empirical Strategy.....	11
V. Results .....	18
VI. Discussion.....	21
References.....	24
Tables.....	26
Table 1: Sample Means and Standard Deviations of All Variables, by Immigrant Status .....	27
Table 2: Sample Means of Selected Variables, by Maternal Work Status .....	29
Table 3: OLS Estimates Predicting Standardized Reading Score .....	30
Table 4: OLS Estimates Predicting Standardized Mathematics Score .....	31
Table 5: OLS Estimates Predicting High School Grade Point Average (GPA) .....	32
Table 6: OLS Estimates for the Effect of Full-Time Maternal Employment .....	33
Table 7: The Effect of Full-Time Maternal Employment, by Mother’s Education.....	34
Appendix.....	37

## I. INTRODUCTION

A substantial amount of literature exists exploring the effect of maternal employment on the cognitive, psychological, and physical development of children. A prime reason for this branch of research has been the sustained increase in the number of working mothers in recent decades. In 1960, about 30 percent of all mothers in the U.S. with children under age 6 were working, yet by 2012 this number had more than doubled, reaching 64 percent. For women with children under the age of 18, labor force participation rates were approximately 73 percent in 2012 (Bureau of Labor Statistics, 2013a).

Intuitively, there are several ways that a mother working could influence the development and outcomes of her children. First, working mothers could spend less time with their children. The reduced time investments by the mother could decrease the time spent supervising and interacting with the child, such helping with homework, reading to children, or preparing healthy home-cooked meals. However, there is also an income effect: an employed mother is bringing additional revenue to the household, which can improve the wellbeing of the family as a whole. This additional income can be invested in the development of the child, and spent on an environment conducive to the child's learning and health, as well as goods and services to improve child's wellbeing (e.g. tutoring, childcare, healthy food). These goods and services could be viewed as substitutes for the additional time a mother would have spent with the child if she were not working.

For older children with working mothers, there is a third possible effect. Seeing one's mother successfully working could influence a child to perform better in school, pursue a post-secondary degree, or even refrain from risky behaviors (Aughinbaugh and Gittleman, 2004). The interactions between these three effects and the resulting influence of a mother's

employment on her child's development are theoretically ambiguous. Because of this, there is a wide range of empirical evidence approximating the nature of this relationship and the mechanisms behind it.

Several papers have found a negative effect of maternal employment during the first year of a child's life (Harvey, 1999; Brooks-Gunn, Han and Waldfogel, 2002; Waldfogel, Han and Brooks-Gunn, 2002; Baum, 2003; Ruhm, 2004), yet there has been no agreement as to whether this effect persists into later years of the child's life. Additionally, studies determining the effect of maternal employment on adolescent outcomes fail to reach a consensus as to whether maternal employment is beneficial or detrimental for older children.

This project analyzes the effect of maternal employment on the academic performance of adolescents in high school. In particular, I focus on whether this effect differs between students from immigrant families ("the second generation") and those born to U.S. natives ("natives" or the "third and higher generation"). While there is an abundance of literature analyzing the effect of early maternal employment on children's cognitive development, the majority of this literature focuses on younger children who are U.S. natives and racial and ethnic majorities. This project will add to the existing literature by focusing only on adolescents, and by highlighting the differences in the effect of maternal employment by immigrant status.

Determining the effects of maternal employment in adolescents, and how these effects differ by immigrant generation, is helpful for a variety of reasons. First, exploring the effect of maternal employment by immigrant generation has not yet been done in the literature and may provide informative new results. Immigrants and their children make up a large, and growing, proportion of the population of the United States. Yet despite this, studies of maternal employment fail to account for the differences between the native and immigrant populations.



Previous immigration and assimilation research has established that U.S. immigrants and their children experience distinct trends in educational attainment, relative wages and other socio-economic indicators (Borjas, 1985; Borjas, 1994; Card, DiNardo and Estes, 2000). About 60 percent of foreign born mothers are in the labor market, compared to 73 percent of their U.S. born counterparts (Bureau of Labor Statistics, 2013b). Of particular note, Hamermesh and Trejo (2013) find a statistically significant “immigrant-native difference” in time use that is apparent in a number of activities including education, shopping, and market work. If immigrant mothers invest their time with their children differently (and have different preferences) than mothers born in the U.S., it makes sense to assume that the effect of maternal employment would differ between these two groups of women.

Second, it is useful to know whether maternal employment beyond early childhood has any effects on adolescent cognitive development. Academic performance in high school and college has been shown to be predictive of educational attainment and labor market earnings in adulthood (Jones and Jackson, 1990; Hamermesh and Donald, 2008). Therefore, shedding light on the determinants of academic performance among adolescents has important implications for government policies that aim to increase employment among mothers, such as the 1996 Personal Responsibility and Work Opportunity Reconciliation Act (Blank, 2002; Cawley and Liu, 2012).

I employ public-use data from the first wave of the Education Longitudinal Study of 2002 (ELS: 2002) to explore this relationship. There are many benefits of using these data, as they make it possible to include a large set of controls for differences in household, school, and student background characteristics that may influence educational performance and maternal employment status. Another important feature of this data set is the ability to compare second

generation adolescents with their third and higher generation counterparts in hundreds of high schools across the United States.

I find that full-time maternal employment has a small negative impact on the standardized reading scores and cumulative GPA for adolescents with U.S. born parents, but there is little to no effect on the cognitive outcomes of second generation immigrants. For both second generation and native children, maternal employment has a stronger effect when the mother is better educated, and mathematics scores are not significantly influenced by maternal employment.

While the ELS data provide the unique opportunity to contrast educational performance between immigrant generations, there are also some drawbacks to using these data for an analysis of maternal employment. Survey questions regarding maternal employment only provide information on current work status, without any precise information regarding maternal work history or the number of hours worked. This lack of specificity in measuring maternal employment may bias coefficient estimates, as well as adding to the endogeneity problem in the regression models. Additionally, there is no specific geographic information available in the public ELS data, making it difficult to control for area-specific differences in maternal employment or adolescent cognitive achievement. Because of this, establishing the causal implications of maternal employment in this context is challenging.

The rest of the paper proceeds as follows. Section II provides a brief overview of the maternal employment literature, as well a review of the research motivating the difference between second generation and U.S. natives. Section III proposes a conceptual framework for the utility maximization problem faced by the mother, and Section IV summarizes the data and

empirical methods. Results are given in Section V, while Section VI discusses these results and concludes.

## II. LITERATURE REVIEW

Recent studies have found that maternal employment during the first year of a child's life may have a negative effect on child outcomes (Harvey, 1999; Brooks-Gunn, Han and Waldfogel, 2002; Waldfogel, Han and Brooks-Gunn, 2002; Baum, 2003; Ruhm, 2004). While some find that this adverse effect is only temporary (Harvey, 1999), others find that it persists through ages five and six (Waldfogel, Han and Brooks-Gunn, 2002). Maternal employment in the second and third year does not have a clear negative impact. Waldfogel, Han and Brooks-Gunn (2002) find a negative relationship between child cognitive development and maternal employment during the first year of life, using data from the National Longitudinal Survey of Youth (NLSY). However, maternal employment during the second and third year is found to have positive effects on white children and no significant effect for African-American or Hispanic children.

In an analysis of the same dataset, Ruhm (2004) finds that maternal employment during the first three years has a small negative impact on the verbal abilities of toddlers, and a larger deleterious effect on the reading and mathematics performance of five and six year olds. However, he cautions against implying a causal interpretation to these results and many others in the literature, due to the possibility that mothers who chose to work more hours may possess unobserved traits that are associated with child outcomes (unobserved heterogeneity) that are not adequately accounted for.

Vandell and Ramanan (1992) analyze maternal employment in low-income families. They find that maternal employment is associated with higher math and reading achievement for second-grade children, even after controlling for family environment and selection effects. In an analysis of German panel data, Schildberg-Hoerisch (2011) directly accounts for endogeneity by using sibling differences to estimate a regression model. She finds that early parental employment has little to no effect on children's educational performance.

Many researchers have also analyzed the influence of early maternal employment on child health. Using the NSLY, Anderson, Butcher and Levine (2003) conclude that maternal employment has a causal impact on the probability that a child is overweight. However, they find that this result is driven mainly by mothers with high socioeconomic status, and therefore does not account for those children most likely to be obese. Gennetian et al. (2010) utilize an instrumental variable (IV) approach to identify causal effects, and find a small adverse effect of maternal employment on child health in low-income elementary school children. Morrill (2011) also uses an IV estimation method and finds that maternal employment is associated with an increase in the probability of hospitalizations, injuries, and other adverse health events in children. In contrast, Blau, Guilkey and Popkin (1996) find that maternal employment has little to no effect on infant health outcomes after accounting for the endogeneity of maternal labor supply.

Studies of adolescents also produce mixed results. Bogenschneider and Steinberg (1994) find that among white, middle-class adolescents, maternal employment is associated with lower high school grades. Moore and Driscoll (1997) find that maternal employment may be advantageous for the adolescents in low-income families, even after controlling for income level. Liu, Mroz and Van der Klaauw (2010) also find a positive relationship between maternal

employment and test scores. However, after accounting for parental decisions (i.e. a mother may choose to work so that the family can afford to live in a better school district), the positive relationship between child test scores and maternal employment is reversed.

Ruhm (2008) examines the differences in effects between advantaged (those with high socio-economic status) and disadvantaged families, while attempting to account for unobserved heterogeneity through a comprehensive set of family background controls. His results mirror those found by Moore and Driscoll (1997), and Bogenschneider and Steinberg (1994). He finds that recent maternal employment has a positive influence on adolescent cognitive development for disadvantaged adolescents, while having a more harmful effect for advantaged adolescents.

From the existing literature, it is clear that the effect of maternal employment depends on the point in the child's life, how advantaged the families are, and various demographic characteristics. The literature also emphasizes the prevalence of endogeneity when estimating this relationship. Mothers who choose to work may possess unobserved characteristics that also influence child outcomes, or may allocate their time differently while at home. Failing to account for this may result in large and imprecise coefficient estimates, and does not allow for a causal interpretation of results. Several studies have accounted for this endogeneity by the use of instrumental variables (Anderson, Butcher and Levine, 2003; Morrill, 2011; Cawley and Liu, 2012), or by the use of sibling or individual fixed effects models (Schildberg-Hoerisch, 2011).

Previous research regarding maternal employment tends not to distinguish immigrants and their children, who may face different unobserved preferences, attitudes, and characteristics than their native counterparts. Research has established that the determinants of

educational attainment vary by immigrant generation (Chiswick and DebBurman, 2004), and that immigrants experience different trends in economic performance and labor market outcomes than U.S. natives (Borjas, 1994; Card, DiNardo and Estes, 2000). These unobserved differences between immigrant and native parents may have a significant influence on how maternal employment affects children, a hypothesis which I will expand upon in Section III. Much of the maternal employment literature either restricts the data to only children with U.S. native parents, or fails to adequately control for the unobserved characteristics stemming from differences in immigrant generations. If the effect of maternal employment does indeed vary between second-generation children and those in the third-generation and above, it is important to adequately account for immigrant generation in future studies of maternal employment.

### III. THEORETICAL FRAMEWORK

The conceptual framework for this project is based on the model of Becker (1976) and adapted to this context by Blau, Guilkey and Popkin (1996) and Ruhm (2004). It asserts the idea that a mother allocates her time and resources in order to maximize an objective function that includes the cognitive and health outcomes of her children as an argument. Intuitively, there is a potential tradeoff between the benefits of earning additional household income and those from direct maternal time investments in children.

Consider the utility received by the mother in period  $t$  as a function of her child's outcomes ( $C$ ), consumption goods ( $G$ ), and non market leisure time ( $L$ ):

$$U_t = U(C_t, G_t, L_t, Z_t), \quad (1)$$

where  $Z_t$  is a vector of exogenous determinants of preferences.

Now, suppose that child outcomes in time  $t$  are a function of maternal leisure time ( $L$ ), purchased inputs such as books, food, and medical care ( $G$ ), outcomes in the previous period ( $C_{t-1}$ ), and exogenous shocks ( $X$ ):

$$C_t = C(L_t, G_t, C_{t-1}, X_t) . \quad (2)$$

In this case,  $\frac{\partial C}{\partial L}$  and  $\frac{\partial C}{\partial G}$  are both assumed to be positive, and represent the beneficial effects of additional market and maternal time inputs on child outcomes. These benefits can stem from both the direct time investments of the mother, and the indirect benefits resulting from the mother's reduced stress and increased energy (Ruhm, 2004).

A mother who works faces a time constraint (24 hours), represented by

$$L_t + H_t = 24 , \quad (3)$$

where  $H_t$  are the mother's work hours in period  $t$ . She also faces a budget constraint that determines the amount of goods ( $G$ ) she can purchase:

$$wH_t + I_t = G, \quad (4)$$

where  $w$  is the mother's wage rate, and  $I_t$  is any household income not earned through maternal labor (e.g. income from the father or other family members, or non-labor income).

Subject to these time and budget constraints, the mother chooses the optimal amount of labor ( $H^*$ ) and consumption goods ( $G^*$ ) to maximize her utility function,  $U_t$ . The effect of maternal employment primarily operates via the tradeoff between these two inputs: increasing  $H_t$  brings additional income, allowing for more goods that may be enriching to the child's development and outcomes, but reduces the amount of non-market leisure time of the mother, an input that is also beneficial to the child.

It can be argued that some purchased goods, such as childcare or tutoring, can serve as a substitute for direct maternal time investments. However, the veracity of this argument depends on the differences in quality between maternal and non-maternal care. Similarly, the benefits of maternal time inputs on child educational outcomes depend on the quality of these time inputs and the resources or technologies available to the mother at that time. Therefore, the effect of maternal employment may vary significantly by the ability and human capital of the mother, as well as the unobserved characteristics, preferences, and attitudes of the parents. For this reason, I hypothesize that the influence of maternal employment will present differently among the children born to immigrants than those born to U.S. natives. Card, DiNardo and Estes (2000) find differences in average education attainment between immigrants and natives (those born in the U.S.), as well as a pronounced difference in labor market outcomes and employment rates between immigrant women and those in the second, third and higher generations.

In an analysis of time-use data, Hamermesh and Trejo (2013) conclude that the assimilation differences between U.S. immigrants and natives may be a result of differences in the use of time by immigrant generation. Immigrants invest time differently than natives on activities such as schooling, shopping and doing market work; specifically, they tend to spend less daily time on average on these activities, but perform these activities for longer if they engage in them at all (“a lower daily incidence and higher conditional intensity”). The proposed reason for this difference is that the fixed costs of participating in these “assimilation” activities tend to be higher for immigrants due to factors such as English fluency, a lack of familiarity with American customs, or other characteristics that increase the costs of social interactions.

Because of this, immigrant parents may possess a different set of household preferences and characteristics than parents born in the United States. This includes parental attitudes



towards education or labor supply, which may change the effect of direct maternal time inputs. For example, if immigrant parents value education more than U.S. natives, an immigrant mother may invest more of her time at home towards activities that further her child's education. If this is true, maternal employment may not have as strong of an influence for second-generation children as it would for their U.S. native counterparts, because an immigrant mother's time at home may be invested more efficiently. Or, if an immigrant mother is less fluent in English than her native counterpart, maternal employment could be more beneficial for a second-generation child than for a native child if the additional income from working allows for tutoring or educational resources that the mother may not be able to provide herself.

#### **IV. DATA AND EMPIRICAL STRATEGY**

This paper uses the base year and parent survey from the Education Longitudinal Study of 2002 (ELS: 2002) to analyze the effect of maternal employment on academic achievement among second generation and third generation or higher students. This survey was sponsored by the National Center for Education Statistics, and the publicly released data currently consists of three survey waves. The 2002 base year survey consists of a nationally-representative sample of 17,000 tenth grade students from 750 schools across the United States. Along with the student survey, the ELS also administered a parent questionnaire, cognitive tests in math and reading, and collected school-level administrative information.

For the purposes of this study, I have restricted the original ELS:2002 cohort to a sample of 11,424 tenth grade students who were born in the United States, live in two-parent households, and whose mothers completed the parent questionnaire. Students in single-parent

households were excluded from this study due to the inability to control for changes in household composition occurring before the time of the survey, which could have confounding effects on the analysis. I have excluded all respondents who were born outside of the United States because the early childhood experiences of these individuals are likely to differ in many ways that cannot be controlled for in this analysis. Differences in assimilation among immigrant children have been shown to have a substantial influence on educational outcomes in the U.S., and therefore may bias the estimates of the effect of maternal employment in this project.

Using the ELS :2002 base year data, I have constructed two samples for analysis. The “second generation” sample consists of 2,003 respondents who have at least one parent who immigrated to the United States, and the “native” sample consists of 9,421 respondents with both parents born in the U.S. Approximately 82% of the second generation sample has both parents born abroad.

### **A. Outcomes**

The main outcomes of interest for this paper are measures of adolescent cognitive development; specifically, the standardized reading and mathematics test scores from the ELS administered assessments. According to the U.S. Department of Education, the purpose of these assessments is to “provide measures of student achievement in reading and mathematics that can be related to student background variables and educational processes.” Therefore, it is reasonable to assume that these scores serve as accurate measures of cognitive development.

The ELS cognitive assessments were administered in two stages: an initial first stage consisting of one mathematics section and one reading section, followed by a second stage with difficulty levels determined by performance in the first stage. Standardized scores are

transformations of the initial test scores that provide comparability of individual scores relative to the population as a whole. These scores are scaled to a mean of fifty and standard deviation of ten.

The second measure of cognitive development used for this analysis is each student's grade point average (GPA) for all courses taken between 9<sup>th</sup> and 12<sup>th</sup> grades, as reported on the student's transcript on a traditional 4.0 scale. This measure is reported in the 2004 wave of the ELS, at which point original study participants had completed high school. Because maternal employment is only reported for the 2002 (10<sup>th</sup> grade) period, regression results predicting the effect of maternal employment on GPA may expose a different effect than those predicting standardized test scores in 2002.

## **B. Maternal Employment**

The main measure of maternal employment is the employment status of the mother during the survey year, defined as full time (35 hours or more per week), part-time (less than 35 hours per week), or not working. While it is not a comprehensive measure of maternal employment throughout the child's life, this measure provides suitable information regarding maternal employment in the current period.

In order to proxy for maternal employment in previous periods, the following measures were included in the analysis: whether the mother has ever worked in the U.S., and which, if any, pre-first-grade programs (such as day care, nursery/preschool, Head Start, and kindergarten) the child attended. It is more likely for a child to attend day care or nursery school if his or her mother is working and cannot stay home to look after her children. Controlling for these factors

also captures differences in early-life education or childcare that may influence cognitive outcomes in the current period.

### **C. Other Explanatory Variables**

This analysis takes advantage of the wide variety of student, family and school characteristics available in the ELS:2002 that may be correlated with maternal employment and student cognitive outcomes. Controlling for these factors also accounts for some differences in maternal preferences ( $U_t$ ) that may differ by background. Regressions include a basic set of background characteristics consisting of dummy variables for race, gender, mother's educational attainment, father's educational attainment, and father's work status, as well as continuous measures of age, and mother's age. Also included in this analysis are an additional set of demographic characteristics including annual household income, number of siblings, the mother's occupational category, and the grandparent's highest level of education. This set of controls accounts for differences in ability of the mother, socioeconomic status differences, and possible differences in genetic cognitive endowments (as represented by the educational attainment of the grandparents).

For the second generation sample, parents' immigration backgrounds are also accounted for. This set of covariates includes an indicator for whether the mother is an immigrant, how long the mother has lived in the U.S., the mother's native language, and her self-reported English fluency. One limitation to the public-use ELS data is a lack of information regarding the specific country of origin for immigrant parent respondents. The immigration literature has established that immigrant trends and outcomes in the U.S. differ significantly depending on the region of

origin for the immigrant (Borjas, 1984; Borjas, 1995; Card, DiNardo and Estes, 2000; Smith, 2006). However, native language categories can serve as a proxy for this information.

School level controls will be included to account for any differences in the quality of students' education and any other school-level characteristics. These include school type (public, catholic, non-catholic private), as well as a dummy for whether more than fifty percent of a school is eligible for free lunch. I also control for whether the tenth grader held a job during the school year, which may play a role in maternal work decisions as well as student academic achievement.

#### **D. Empirical Strategy and Limitations**

I use Ordinary Least Squares (OLS) regression to estimate the following equation:

$$C = \beta_0 + MOTHEMP\beta_1 + X\beta_2 + \varepsilon, \quad (5)$$

where  $C$  represents the student's cognitive outcomes (standardized reading score, standardized mathematics score, or GPA),  $MOTHEMP$  represents the maternal employment status dummy variables (full-time employment and part-time employment),  $X$  is a vector of the student-level demographic controls including parent, household and school characteristics, and  $\varepsilon$  is the error term, which is estimated with robust methods.

Because maternal work status is measured using dummy variables for full-time, part-time, and not working, I also estimate an equation of the following form:

$$C = \beta_0 + FT\beta_1 + X\beta_2 + \varepsilon, \quad (6)$$

where  $FT$  is a dummy variable for whether the mother is employed full-time or not. A regression of this form can determine whether working full-time (compared to working not at all or less than 35 hours per week) has any impact on child outcomes.

All models are estimated separately for the second generation group and the native group. An additional analysis that stratifies by the mother's educational attainment is also conducted, in order to account for the possibility that mothers with higher human capital may also possess unobserved traits that influence child outcomes.

There are some limitations associated with this empirical design. Data limitations do not allow for precise controls of maternal employment or child outcomes in past periods, which would both conceivably influence current child outcomes. Additionally, these OLS estimates would be biased if maternal employment is correlated with the error term, which is a significant concern in this context. For example, mothers who chose to work may have unobserved human capital endowments that also influence the way they raise their children, and in turn affect their children's outcomes.

Because this paper focuses on studying adolescents, more estimation problems may arise. While one still has to consider endogeneity problem mentioned above (mothers who choose to work may have different characteristics than those who don't), there also becomes an issue of reverse causality. Mothers' decisions to work may be influenced by their child's educational achievement or health status, and if this is not accounted for, regression results may be misleading. Additionally, there could be a complex causal relationship between a mother's decision to work and her child's outcomes due to the fact that families may choose where to live because of school characteristics and job market opportunities (Liu, Mroz and Van der Klaauw, 2010).

While an instrumental variables approach was considered to address the endogeneity problem, the lack of geographic identifiers or specific sibling information in the public use ELS

data does not allow for a feasible instrument in this analysis. Several studies have found that exogenous variations in state level unemployment can serve to alleviate the endogeneity of maternal employment (Anderson, Butcher and Levine, 2003; Cawley and Liu, 2012), and Morrill (2011) uses the youngest sibling's eligibility for kindergarten as an instrument for maternal employment, with promising results. However, the public ELS data does not have information about which state each respondent lives in, or any information about sibling birth order or the ages of each child in the household. While a large set of demographic controls are employed to minimize the possibility of omitted variable bias, it is likely that the problems outlined above still effect the estimates.

### **E. Summary Statistics**

Table 1 presents summary statistics for all variables of analysis, along with tests for significant differences by immigrant generation. As seen in the table, on average the U.S. natives are more likely to have higher standardized test scores and GPAs. These differences are statistically significant at the one percent significance level for reading scores and GPA, and at the ten percent level for mathematics scores.

Maternal work status is also significantly different across immigrant generations. However, in contrast to the trends found in the literature, immigrant mothers in the ELS data have a higher labor force participation rate than native US mothers, with nearly 85 percent of immigrant mothers in the sample working full time (compared to 76 percent of native mothers). Immigrant parents have lower educational attainment on average, as well as lower annual household income.

Table 2 displays sample means and standard deviations for selected variables by maternal work status. For the second generation sample, average cognitive outcomes were statistically similar across maternal work status. However, children in the native sample with mothers working part time are more likely to perform better on the cognitive outcomes, followed by those with mothers who were not working, and full-time maternal employment is associated with the lowest average cognitive outcomes.

Of particular note in Table 2 are the differences in average income across maternal work status between the immigrant and native groups. For immigrant families, full-time maternal employment is associated with higher average household income than working part time or not at all. However, in native families, a mother not working is associated with the highest level of annual household income of the three groups. These characteristics suggest that for U.S. natives in the sample, not working could be a luxury provided by a high socio-economic status, while for immigrant mothers, this lack of employment is not a choice but rather a lack of job opportunities or the inability to find permanent employment.

## **V. RESULTS**

Tables 3, 4 and 5 present estimates of the effects of maternal work status on the three outcomes of interest: standardized reading scores, standardized mathematics scores, and high school GPA, by immigrant status. The reference group for the maternal employment dummy variables is all mothers who are not working. Therefore, these tables provide estimates of the effect of a mother working full time, or part time, compared to not working at all. Full regression results for these models are provided in Appendix Tables A1, A2 and A3.



In each of the three tables, Model 1 estimates the influence of the maternal work status variables without any controls, Model 2 adds basic student and household characteristics (including immigration background for the second-generation sample), Model 3 controls for the additional set of characteristics, and Model 4 includes the full set of covariates. Showing regression coefficients from the naïve model (Model 1) highlights the strong effects of maternal employment when one does not control for the necessary background and household characteristics. However, as basic, auxiliary, and school controls are added (factors that also contribute to these child outcomes) one can see that the effect of maternal employment often becomes insignificant.

In a simple regression of maternal work status on standardized reading scores, full-time maternal employment has a positive and weakly significant effect on the reading scores for second generation children. However, this effect becomes negative and insignificant after including the full set of student, household and school characteristics (Model 4), and part-time maternal employment also has no significant influence on reading scores. For native children, full-time maternal employment has a negative and statistically significant effect on standardized reading score in the fully specified model: full-time employment is associated with reading scores that are 0.79 points lower than the scores for a child whose mother is not working at all.

For both second generation and native students, full time and part-time maternal employment do not have a statistically significant effect on mathematics test scores. However, the effect on GPA differs significantly by immigrant generation. For second generation students, full-time maternal employment has a small negative effect on GPA (about 0.1 points on a 4.0 scale), with no significant effect for part-time employment. In contrast, for native students part-

time maternal employment has a small positive and significant effect on GPA for native students (0.05 points on a 4.0 scale), with no effect for full-time employment.

While the effects of maternal employment differ by full-time and part-time classification, it may be more informative to understand whether full-time maternal employment has a significantly different effect on cognitive development than the effect of *not* working full-time (regardless of whether the mother is employed part-time or not at all). This is especially relevant because the children studied in this paper are in school for most of the day, and therefore may not experience any difference in time spent with mothers who work part time compared to those who do not work at all.

Table 6 provides the estimates for the effect of full-time maternal employment in both samples. After controlling for income and other demographic characteristics, full-time employment has no significant effect on standardized math and reading scores for second generation immigrants, and a small, weakly significant negative effect on GPA. For the native sample, full-time employment of the mother results in statistically significant reductions in standardized reading scores (about 0.8 points) and in GPA (0.04 points), but is no significant effect on standardized math scores in the fully specified model.

Table 7 reports the OLS estimates for the effect of full-time maternal employment by education level. For the native sample, children with mothers who have at least some college education are associated with slightly lower standardized reading scores and GPA. However, for children with mothers with a high school degree or less, maternal employment did not have any significant effect on any of the educational outcomes. These results are mirrored in the native

sample, with households with a better educated mother experiencing some detrimental effects of maternal employment on child GPA.

## **VI. DISCUSSION**

The results of this analysis further support the hypothesis that maternal employment influences the children of immigrants differently than children with U.S.-born parents. Maternal employment does not generally have a significant effect on cognitive assessment scores for second-generation adolescents, although there is evidence of a 0.1 reduction in GPA for children with fully employed mothers. The effect of maternal employment is more significant for students with parents native to the United States, but magnitudes remain small. For these adolescents, full-time maternal employment is associated with a 0.8 point reduction in reading assessment scores and a 0.04 point reduction GPA, particularly in households with better educated mothers. However, maternal employment has no significant effect on standardized mathematics scores in either group.

Additionally, the information gleaned from stratifying these samples by maternal education support the idea that “quality” of maternal time inputs matters in addition to quantity. The negative impacts of maternal employment are statistically significant for U.S. born mothers with at least some college education, while maternal employment does not have strong influences on adolescent cognitive outcomes for those students with a less educated mother.

The lack of negative influence of maternal employment in the second generation sample may be due to the differences in income across maternal work status seen in Table 2. For immigrant families, mothers who work are associated with higher income households than those

who are not employed. The opposite is true in native families: mothers who work are associated with the lowest average household income, while native mothers who choose not to work have the highest average household income. This may indicate that the income effect of maternal employment is stronger for immigrant families and overshadows any negative effect of reduced maternal time with the children.

The fact that second generation immigrants are influenced by maternal employment differently than their native counterparts has important implications for future study. First and second generation immigrants make up nearly 25 percent of the U.S. population, and are projected to reach nearly 37 percent by 2050. Pew Research Center (2013) estimates that “93 percent of the growth of the nation’s working-age population between now and 2050 will be accounted for by immigrants and their U.S.-born children...” Therefore, it is important to understand whether there are any unintended consequences of labor market participation for immigrant women, and to understand the determinants of cognitive development among the children of immigrants because they are a large and growing part of this nation’s population. It is clear that conclusions drawn from studies primarily focused on U.S. natives can not necessarily apply to immigrants and their children, and therefore the policy implications in the maternal employment literature may not actually influence this portion of the population.

However, because the empirical models used in this analysis do not adequately account for mothers’ work history, past child characteristics, and unobserved heterogeneity, the results cannot be interpreted as causal implications of maternal employment. Rather, they provide evidence of associations between maternal employment and adolescent cognitive outcomes, and expand on the way these associations differ between the children of immigrants and U.S. natives. Further research is warranted, particularly examining the variations in the

relationship between maternal employment and child outcomes over time. It would also be useful to compare this relationship by the immigrant parents' country of origin.

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**Table 1: Sample Means and Standard Deviations of All Variables, by Immigrant Status**

	Second Generation (N=2,003)	U.S. Native (N=9,421)	Total (N=11,424)
<b>Outcomes</b>			
Standardized Mathematics Score*	51.15 (10.38)	51.60 (9.64)	51.52 (9.78)
Standardized Reading Score***	50.30 (9.96)	51.86 (9.76)	51.59 (9.81)
High School GPA***	2.72 (0.78)	2.77 (0.75)	2.76 (0.76)
<b>Maternal Employment</b>			
Maternal Work Status			
Not Working***	0.101 (0.302)	0.175 (0.38)	0.115 (0.319)
Part Time**	0.051 (0.22)	0.067 (0.25)	0.054 (0.225)
Full Time***	0.848 (0.359)	0.758 (0.428)	0.832 (0.374)
Mother Never Held Job for Pay (in US) ***	0.053 (0.224)	0.007 (0.084)	0.015 (0.123)
<b>Basic Student and Household Characteristics</b>			
Age	16.02 (0.52)	16.16 (0.50)	16.14 (0.51)
Female	0.493 (0.500)	0.507 (0.500)	0.505 (0.500)
Race			
Asian/Pacific Islander***	0.294 (0.456)	0.009 (0.094)	0.059 (0.235)
Black or African-American***	0.064 (0.245)	0.149 (0.356)	0.134 (0.341)
Hispanic***	0.377 (0.485)	0.061 (0.240)	0.116 (0.321)
Mixed Race***	0.070 (0.256)	0.051 (0.221)	0.055 (0.227)
White, non-Hispanic***	0.195 (0.397)	0.730 (0.444)	0.636 (0.481)
Mother's Age***	47.06 (6.84)	45.88 (6.27)	46.06 (6.38)
Mother's Education			
High School***	0.449 (0.497)	0.343 (0.475)	0.362 (0.480)
Some College***	0.268 (0.443)	0.376 (0.484)	0.357 (0.479)
College Degree	0.198 (0.398)	0.190 (0.393)	0.192 (0.394)
Graduate or Professional Degree	0.085 (0.280)	0.091 (0.287)	0.090 (0.286)
Father's Work Hours***	27.253(17.235)	28.377(16.359)	28.181(16.52)
Father's Education			
High School**	0.415 (0.493)	0.387 (0.487)	0.392 (0.488)
Some College***	0.231 (0.421)	0.288 (0.453)	0.278 (0.448)
College Degree	0.179 (0.384)	0.185 (0.389)	0.184 (0.388)
Graduate Degree***	0.174 (0.380)	0.139 (0.346)	0.145 (0.352)
<b>Immigration Background</b>			
Mother is an Immigrant***	0.797 (0.402)	0.000 (0.000)	0.139 (0.346)
Years in the US (Mother)	24.46 (8.53)	--	24.46 (8.53)
Mother's Native Language			
English***	0.459 (0.498)	0.987 (0.115)	0.899 (0.301)
Spanish***	0.266 (0.442)	0.009 (0.092)	0.051 (0.22)
European Language***	0.028 (0.165)	0.001 (0.034)	0.006 (0.075)
West/South Asian Language***	0.036 (0.185)	0.001 (0.023)	0.006 (0.079)
Pacific Asian/Southeast Asian***	0.170 (0.376)	0.001 (0.029)	0.029 (0.167)

Other***	0.041 (0.198)	0.002 (0.048)	0.009 (0.093)
Mother is Fluent in English***	0.706 (0.456)	0.998 (0.043)	0.953 (0.212)
<b>Additional Student and HH Characteristics</b>			
Annual Household Income***	60,643 (53,023)	70,240 (55,207)	68,557 (54,949)
Number of Siblings***	2.45 (1.60)	2.25 (1.49)	2.28 (1.51)
Mother's Occupation			
Clerical**	0.062 (0.241)	0.048 (0.215)	0.051 (0.219)
Operative/Crafts	0.272 (0.445)	0.261 (0.439)	0.263 (0.440)
Farmer/Laborer***	0.140 (0.347)	0.108 (0.310)	0.114 (0.317)
Service/Household***	0.092 (0.289)	0.047 (0.212)	0.055 (0.228)
Manager/Professional***	0.367 (0.482)	0.437 (0.496)	0.425 (0.494)
Military/Protective Services***	0.023 (0.149)	0.042 (0.200)	0.038 (0.192)
Sales**	0.044 (0.205)	0.057 (0.231)	0.054 (0.227)
Grandparents' Highest Level of Education			
High School***	0.595 (0.491)	0.501 (0.500)	0.516 (0.500)
Some College***	0.115 (0.319)	0.196 (0.397)	0.183 (0.386)
College Degree	0.166 (0.372)	0.177 (0.381)	0.175 (0.38)
Graduate Degree	0.125 (0.33)	0.127 (0.333)	0.127 (0.332)
<b>School and Educational Characteristics</b>			
More than 50% eligible for free lunch***	0.199 (0.399)	0.110 (0.313)	0.125 (0.331)
School Type			
Public***	0.809 (0.393)	0.759 (0.428)	0.768 (0.422)
Catholic***	0.119 (0.324)	0.144 (0.351)	0.140 (0.347)
Private, not Catholic***	0.071 (0.258)	0.097 (0.296)	0.093 (0.290)
Student held job for pay during school year***	0.286 (0.452)	0.414 (0.493)	0.393 (0.488)
Student attended day care program***	0.323 (0.468)	0.385 (0.487)	0.375 (0.484)
Student attended nursery/pre-school***	0.566 (0.496)	0.646 (0.478)	0.632 (0.482)
Student attended Head Start program***	0.229 (0.42)	0.161 (0.367)	0.172 (0.378)
Student attended Kindergarten***	0.959 (0.198)	0.977 (0.151)	0.974 (0.16)

Notes: Standard deviations in parentheses. Statistically significant differences by immigrant status assessed using unequal variance t-tests

\*  $p < 0.1$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$

**Table 2: Sample Means of Selected Variables, by Maternal Work Status**

	Maternal Work Status			
	Not Working	Part-Time	Full-Time	Total
<b><i>Second Generation Immigrants</i></b>	(N=212)	(N=88)	(N=998)	(N=1,298)
<b>Outcomes</b>				
Standardized Mathematics Score	49.49 (11.08)	51.51 (11.13)	51.77 (10.12)	51.35 (10.39)
Standardized Reading Score	48.54 (10.45)	50.36 (10.68)	50.83 (9.78)	50.40 (9.99)
High School GPA	2.71 (0.78)	2.81 (0.76)	2.73 (0.76)	2.73 (0.77)
<b>Demographics</b>				
Annual Household Income***	51,713 (51,450)	59,234 (54,958)	69,637 (54,528)	65,804 (54,449)
Mother's Age	49.64 (9.62)	47.92 (8.55)	46.67 (6.22)	46.99 (6.75)
Mother Completed College**	0.216 (0.413)	0.270 (0.446)	0.316 (0.465)	0.295 (0.456)
Father Completed College	0.396 (0.490)	0.443 (0.500)	0.408 (0.492)	0.408 (0.492)
Father's Work Hours*	35.44 (12.14)	37.21 (9.60)	34.71 (12.54)	35.32 (11.99)
Mother is an Immigrant**	0.834 (0.373)	0.847 (0.362)	0.786 (0.41)	0.799 (0.401)
Years in the US (Mother)	22.73 (7.48)	22.64 (7.73)	24.72 (8.54)	24.23 (8.35)
<b><i>Native to US</i></b>	(N=1,102)	(N=1,097)	(N=3,606)	(N=5,805)
<b>Outcomes</b>				
Standardized Mathematics Score***	53.73 (9.81)	54.72 (9.09)	53.18 (9.11)	53.58 (9.26)
Standardized Reading Score***	54.11 (10.02)	55.11 (9.09)	53.031 (9.405)	53.628 (9.501)
High School GPA***	2.94 (0.69)	3.01 (0.68)	2.91 (0.70)	2.93 (0.70)
<b>Demographics</b>				
Annual Household Income	91,425 (71,782)	83,659 (55,745)	81,989 (52,284)	84,096 (57,229)
Mother's Age	44.63 (5.57)	44.79 (4.67)	44.27 (5.00)	44.46 (5.06)
Mother Completed College	0.332 (0.471)	0.351 (0.477)	0.342 (0.475)	0.342 (0.474)
Father Completed College***	0.445 (0.497)	0.439 (0.497)	0.352 (0.478)	0.386 (0.487)
Father's Work Hours***	35.44 (12.14)	37.22 (9.60)	34.71 (12.52)	35.32 (11.99)

Notes: Standard deviations in parentheses. Kruskal-Wallis tests were used to assess significant differences across maternal work status categories.

\*  $p < 0.1$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$

**Table 3: OLS Estimates Predicting Standardized Reading Score**

	Second Generation Immigrants				Native to U.S.			
	(1)	(2)	(3)	(4)	(1)	(2)	(3)	(4)
<b>Maternal Work Status<sup>1</sup></b>								
Part-Time	1.503 (1.358)	1.315 (1.211)	0.374 (1.262)	0.047 (1.367)	0.993** (0.409)	0.473 (0.365)	0.196 (0.381)	0.153 (0.393)
Full-Time	1.464* (0.789)	0.885 (0.718)	-0.324 (0.870)	-0.470 (0.909)	-1.080*** (0.341)	-0.701** (0.304)	-1.026*** (0.326)	-0.792** (0.337)
<b>Other Regressors</b>								
Basic Student and Household Characteristics		X	X	X		X	X	X
Immigration Background		X	X	X				
Additional Student and Household Characteristics			X	X			X	X
School and Educational Characteristics				X				X
Observations	1,294	1,234	1,068	1,068	5,791	5,659	5,304	5,304

Notes: Robust standard errors reported in parentheses. Scores are standardized to have a mean of fifty and standard deviation of ten. Indicators (not reported) for missing values are used to preserve sample sizes.

<sup>1</sup> Reference group is mothers who are not working

\*  $p < 0.1$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$

**Table 4: OLS Estimates Predicting Standardized Mathematics Score**

	Second Generation Immigrants				Native to U.S.			
	(1)	(2)	(3)	(4)	(1)	(2)	(3)	(4)
<b>Maternal Work Status<sup>1</sup></b>								
Part-Time	1.239 (1.447)	1.420 (1.254)	0.715 (1.350)	0.503 (1.409)	0.989** (0.404)	0.490 (0.354)	0.411 (0.365)	0.531 (0.374)
Full-Time	1.183 (0.820)	1.210 (0.707)	0.702 (0.842)	0.671 (0.835)	-0.549* (0.333)	-0.077 (0.287)	-0.164 (0.307)	0.110 (0.316)
<b>Other Regressors</b>								
Basic Student and Household Characteristics		X	X	X		X	X	X
Immigration Background		X	X	X				
Additional Student and Household Characteristics			X	X			X	X
School and Educational Characteristics				X				X
Observations	1,294	1,234	1,068	1,068	5,791	5,659	5,304	5,304

Notes: Robust standard errors reported in parentheses. Scores are standardized to have a mean of fifty and standard deviation of ten. Indicators (not reported) for missing values are used to preserve sample sizes.

<sup>1</sup> Reference group is mothers who are not working

\*  $p < 0.1$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$

**Table 5: OLS Estimates Predicting High School Grade Point Average (GPA)**

	Second Generation Immigrants				Native to U.S.			
	(1)	(2)	(3)	(4)	(1)	(2)	(3)	(4)
<b>Maternal Work Status<sup>1</sup></b>								
Part-Time	0.001 (0.098)	-0.055 (0.085)	-0.102 (0.089)	-0.125 (0.098)	0.074** (0.030)	0.047* (0.028)	0.045* (0.027)	0.052* (0.029)
Full-Time	-0.064 (0.059)	-0.091* (0.052)	-0.096* (0.055)	-0.126** (0.059)	-0.031 (0.025)	-0.002 (0.023)	-0.008 (0.024)	-0.009 (0.025)
<b>Other Regressors</b>								
Basic Student and Household Characteristics		X	X	X		X	X	X
Immigration Background		X	X	X				
Additional Student and Household Characteristics			X	X			X	X
School and Educational Characteristics				X				X
Observations	1,224	1,166	1,010	1,010	5,791	5,659	5,304	5,304

Notes: Robust standard errors reported in parentheses. High School GPA is the student's cumulative GPA from 9<sup>th</sup> through 12<sup>th</sup> grade. Indicators (not reported) for missing values are used to preserve sample sizes.

<sup>1</sup> Reference group is mothers who are not working

\*  $p < 0.1$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$

**Table 6: OLS Estimates for the Effect of Full-Time Maternal Employment<sup>1</sup>**

Outcome	Second Generation Immigrants				Native to U.S.			
	(1)	(2)	(3)	(4)	(1)	(2)	(3)	(4)
Standardized Reading Score	1.022 (0.688)	0.496 (0.622)	-0.463 (0.721)	0.058 (0.731)	-1.577*** (0.258)	-0.938*** (0.235)	-1.130*** (0.249)	-0.807*** (0.256)
Standardized Math Score	0.819 (0.721)	0.790 (0.622)	0.435 (0.730)	0.691 (0.711)	-1.044*** (0.253)	-0.322 (0.226)	-0.382 (0.241)	-0.171 (0.244)
High School GPA (grades 9-12)	-0.064 (0.051)	-0.074 (0.045)	-0.095* (0.053)	-0.090* (0.054)	-0.069*** (0.019)	-0.026 (0.018)	-0.036* (0.019)	-0.039** (0.020)
<b>Other Regressors</b>								
Basic Student and Household Characteristics		X	X	X		X	X	X
Immigration Background		X	X	X				
Additional Student and Household Characteristics			X	X			X	X
School and Educational Characteristics				X				X
Observations	1,224	1,166	1,010	1,010	5,419	5,280	4,955	4,955

Notes: Robust standard errors reported in parentheses. Scores are standardized to have a mean of fifty and standard deviation of ten. High School GPA is the student's cumulative GPA from 9<sup>th</sup> through 12<sup>th</sup> grade. Indicators (not reported) for missing values are used to preserve sample sizes.

<sup>1</sup> Reference group is mothers who are not working or who are working part time only.

\*  $p < 0.1$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$

**Table 7: Estimates of the Effect of Full-Time Maternal Employment<sup>1</sup>, by Mother's Education**

Outcome	Second Generation Immigrants		Native to U.S.	
	H.S. or Less	Some College	H.S. or Less	Some College
Standardized Reading Score	-0.552 (1.155)	-0.765 (1.094)	-0.928* (0.507)	-0.862*** (0.309)
Standardized Math Score	0.722 (1.163)	0.271 (1.062)	0.033 (0.489)	-0.297 (0.295)
High School GPA (grades 9-12)	-0.123 (0.098)	-0.129* (0.076)	0.001 (0.042)	-0.054** (0.023)
Observations	1,224	1,166	5,419	5,280

Notes: Robust standard errors reported in parentheses. Scores are standardized to have a mean of fifty and standard deviation of ten. High School GPA is the student's cumulative GPA from 9<sup>th</sup> through 12<sup>th</sup> grade. Indicators (not reported) for missing values are used to preserve sample sizes. Estimates are reported from the fully specified model with all covariates included (Model 4).

<sup>1</sup> Reference group is mothers who are not working or who are working part time only.



**Appendix Table A1: Correlation Matrix for All Variables of Analysis**

	Second Generation			U.S. Native		
	Reading score	Mathematics Score	GPA	Reading score	Mathematics Score	GPA
<b>Maternal Employment</b>						
Maternal Work Status						
Part Time	-0.012	-0.015	0.013	0.068	0.056	0.060
Full Time	0.030	0.054	-0.042	-0.089	-0.057	-0.061
Mother Never Held Job for Pay (in US)	-0.076	-0.014	0.006	-0.062	-0.053	-0.032
<b>Basic Student and Household Characteristics</b>						
Age	-0.152	-0.178	-0.222	-0.133	-0.161	-0.131
Female	0.063	-0.049	0.219	0.074	-0.062	0.188
Race						
Asian/Pacific Islander	0.196	0.293	0.222	-0.008	0.015	0.011
Black or African-American	0.012	-0.030	-0.043	-0.190	-0.208	-0.172
Hispanic	-0.355	-0.371	-0.282	-0.096	-0.115	-0.100
Mixed Race	0.079	0.082	0.097	-0.067	-0.066	-0.072
Mother's Age	0.108	0.134	0.119	0.134	0.145	0.120
Mother's Education						
Some College	0.083	0.059	0.055	-0.052	-0.049	-0.062
College Degree	0.224	0.222	0.180	0.182	0.174	0.149
Graduate or Professional Degree	0.160	0.196	0.112	0.184	0.195	0.168
Father's Work Hours	0.086	0.100	0.076	0.055	0.052	0.050
Father's Education						
Some College	-0.014	-0.046	-0.043	-0.051	-0.047	-0.077
College Degree	0.140	0.137	0.095	0.156	0.145	0.125
Graduate Degree	0.280	0.349	0.302	0.227	0.240	0.198
<b>Immigration Background</b>						
Mother is an Immigrant	-0.085	-0.046	0.008			
Years in the US (Mother)	0.047	-0.025	-0.038			
Mother's Native Language						
Spanish	-0.291	-0.298	-0.247			
European Language	0.029	0.027	0.013			
West/South Asian Language	0.082	0.105	0.111			
Pacific Asian/Southeast Asian	0.173	0.245	0.197			
Other	0.013	-0.028	-0.016			
Mother is Fluent in English	0.128	0.092	0.072			
<b>Additional Student and HH Characteristics</b>						
Annual Household Income	0.355	0.360	0.254	0.277	0.309	0.199
Number of Siblings	-0.248	-0.267	-0.212	-0.101	-0.089	-0.066
Mother's Occupation						

Clerical	0.059	0.043	0.025	-0.027	-0.016	-0.003
Operative/Crafts	-0.152	-0.201	-0.130	-0.115	-0.098	-0.128
Farmer/Laborer	-0.229	-0.257	-0.192	-0.087	-0.085	-0.053
Service/Household	-0.030	-0.014	0.004	-0.089	-0.101	-0.064
Military/Protective Services	0.009	-0.008	-0.019	-0.028	-0.044	-0.017
Sale	0.041	0.048	0.011	0.009	0.004	-0.012
Grandparents' Highest Level of Education						
Some College	0.068	0.034	0.003	0.033	0.015	0.018
College Degree	0.144	0.202	0.193	0.112	0.123	0.085
Graduate Degree	0.168	0.160	0.106	0.178	0.177	0.111
<b>School and Educational Characteristics</b>						
More than 50% eligible for free lunch	-0.226	-0.235	-0.154	-0.162	-0.181	-0.084
School Type						
Catholic	0.172	0.082	0.095	0.123	0.098	0.055
Private, not Catholic	0.119	0.091	0.094	0.116	0.133	0.097
Student held job for pay during school year	0.048	0.013	-0.002	0.024	0.021	-0.002
Student attended day care program	0.096	0.118	0.023	-0.017	-0.015	-0.003
Student attended nursery/pre-school	0.273	0.284	0.179	0.131	0.165	0.095
Student attended Head Start program	-0.100	-0.068	-0.102	-0.207	-0.225	-0.213
Student attended Kindergarten	0.038	0.035	0.041	-0.020	0.003	0.002

**Appendix Table A2: Full Results-OLS Estimates Predicting Standardized Reading Score**

	Second Generation Immigrants				Natives			
	(1)	(2)	(3)	(4)	(1)	(2)	(3)	(4)
<b>Maternal Employment<sup>1</sup></b>								
Part-Time	1.503 (1.358)	1.315 (1.211)	0.374 (1.262)	0.047 (1.367)	0.993** (0.409)	0.473 (0.365)	0.196 (0.381)	0.153 (0.393)
Full-Time	1.464* (0.789)	0.885 (0.718)	-0.324 (0.870)	-0.470 (0.909)	-1.080*** (0.341)	-0.701** (0.304)	-1.026*** (0.326)	-0.792** (0.337)
<b>Basic Student and Household Characteristics</b>								
Age of Student		-1.914*** (0.506)	-1.735*** (0.537)	-1.529*** (0.567)		-2.604*** (0.272)	-2.336*** (0.278)	-2.108*** (0.289)
Female		0.644 (0.505)	1.010* (0.528)	0.900 (0.567)		1.395*** (0.227)	1.420*** (0.233)	1.329*** (0.241)
Race of Student								
Asian/Pacific Islander		-0.321 (0.713)	0.435 (0.930)	1.241 (1.024)		-2.363** (1.136)	-2.639** (1.149)	-2.761** (1.256)
Black or African American		-3.473*** (1.246)	-1.643 (1.241)	-0.751 (1.285)		-6.385*** (0.420)	-5.465*** (0.452)	-4.111*** (0.497)
Hispanic		-4.382*** (0.720)	-3.914*** (1.016)	-3.571*** (1.064)		-2.917*** (0.530)	-2.894*** (0.559)	-2.372*** (0.567)
Mixed Race		0.131 (1.060)	-0.291 (1.188)	0.045 (1.272)		-2.972*** (0.578)	-2.665*** (0.606)	-2.333*** (0.595)
Mother's Age		0.034 (0.041)	0.026 (0.046)	0.003 (0.047)		0.055** (0.023)	0.063*** (0.024)	0.041* (0.025)
Mother's Highest Level of Education								
Some College		3.056*** (0.702)	2.203*** (0.763)	2.126*** (0.780)		1.685*** (0.304)	0.983*** (0.325)	0.980*** (0.338)
College Degree		3.762*** (0.787)	2.580*** (0.849)	2.611*** (0.926)		3.749*** (0.372)	2.469*** (0.410)	2.354*** (0.429)
Graduate or Professional Degree		4.506*** (1.057)	2.028* (1.155)	2.077* (1.201)		4.740*** (0.442)	3.237*** (0.484)	3.417*** (0.500)
Father's Highest Level of Education								
Some College		2.003*** (0.732)	1.054 (0.803)	0.634 (0.842)		2.200*** (0.312)	1.734*** (0.327)	1.746*** (0.340)
College Degree		2.793*** (0.779)	1.848** (0.869)	1.500 (0.936)		4.111*** (0.372)	3.120*** (0.398)	2.927*** (0.414)
Graduate or Professional Degree		5.450*** (0.872)	3.028*** (1.035)	2.264** (1.120)		5.133*** (0.411)	3.639*** (0.457)	3.493*** (0.475)
Father's Work Hours		0.023 (0.015)	-0.015 (0.016)	-0.015 (0.017)		0.021** (0.010)	0.012 (0.010)	0.009 (0.010)
<b>Immigration Background</b>								

Mother is an Immigrant	-1.559**	-1.660**		
	(0.767)	(0.799)		
Mother's Native Language				
Spanish	0.710	1.110		
	(0.996)	(1.035)		
Other European Language	0.805	1.362		
	(1.847)	(1.912)		
West or South Asian Language	-0.578	-0.029		
	(1.383)	(1.494)		
Pacific or Southeast Asian Language	1.494	1.694*		
	(0.926)	(0.996)		
Other Language Group	-0.875	-0.818		
	(1.360)	(1.473)		
Mother is Fluent in English	-0.225	-0.836		
	(0.926)	(0.987)		
<b>Additional Student and Household Characteristics</b>				
Annual Household income	0.000***	0.000***	0.000***	0.000***
	(0.000)	(0.000)	(0.000)	(0.000)
Number of Siblings	-0.881***	-0.743***	-0.326***	-0.311***
	(0.197)	(0.210)	(0.100)	(0.106)
Mother's Occupation				
Clerical	0.438	0.179	0.197	0.209
	(1.178)	(1.294)	(0.360)	(0.372)
Operative/Crafts	-1.787**	-1.666**	-1.037**	-0.848**
	(0.779)	(0.825)	(0.408)	(0.419)
Farmer/Laborer	-1.682*	-1.384	-0.978	-1.019
	(0.975)	(0.997)	(0.750)	(0.772)
Service/Household	-1.532	-2.065**	-0.597	-0.565
	(0.976)	(1.026)	(0.411)	(0.427)
Military/Protective Services	-0.874	-1.126	-1.255*	-1.595**
	(1.270)	(1.369)	(0.727)	(0.768)
Sales	-0.499	-0.405	-0.410	-0.259
	(1.425)	(1.451)	(0.535)	(0.539)
Grandparents' Highest Level of Education				
Some College	1.164	1.519	1.081***	0.983***
	(0.891)	(0.938)	(0.320)	(0.335)
College Degree	0.633	0.289	0.944***	0.811**
	(0.817)	(0.897)	(0.341)	(0.354)
Graduate or Professional Degree	1.293	0.814	2.126***	1.856***
	(0.949)	(1.005)	(0.387)	(0.398)
<b>School and Educational Characteristics</b>				

More than 50% Eligible for Free Lunch					-0.074 (0.835)				-1.496*** (0.496)
School Type									
Catholic					2.330*** (0.773)				1.098*** (0.317)
Private, not Catholic					1.806 (1.142)				0.764** (0.383)
Student held job for pay during school year					1.287* (0.671)				0.046 (0.261)
Student attended day care program					-0.558 (0.701)				-0.765*** (0.273)
Student attended nursery/pre-school					1.701** (0.667)				0.083 (0.291)
Student attended Head Start program					-0.624 (0.807)				-2.391*** (0.489)
Student attended kindergarten					0.284 (1.391)				-2.153*** (0.794)
Constant	50.055*** (0.726)	76.336*** (8.267)	81.185*** (9.010)	77.726*** (9.622)	54.112*** (0.303)	88.496*** (4.467)	86.095*** (4.563)	85.969*** (4.824)	
Observations	1294	1234	1068	1068	5791	5659	5304	5304	

Notes: Robust standard errors reported in parentheses. Scores are standardized to have a mean of fifty and standard deviation of ten. Indicators (not reported) for missing values are used to preserve sample sizes.

<sup>1</sup> Reference group is mothers who are not working

\*  $p < 0.1$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$

**Appendix Table A3: Full Results-OLS Estimates Predicting Standardized Mathematics Score**

	Second Generation Immigrants				Native to U.S.			
	(1)	(2)	(3)	(4)	(1)	(2)	(3)	(4)
<b>Maternal Employment<sup>1</sup></b>								
Part-Time	1.239 (1.447)	1.420 (1.254)	0.715 (1.350)	0.503 (1.409)	0.989** (0.404)	0.490 (0.354)	0.411 (0.365)	0.531 (0.374)
Full-Time	1.183 (0.820)	1.210 (0.707)	0.702 (0.842)	0.671 (0.835)	-0.549* (0.333)	-0.077 (0.287)	-0.164 (0.307)	0.110 (0.316)
<b>Basic Student and Household Characteristics</b>								
Age of Student		-2.744*** (0.513)	-2.477*** (0.532)	-2.242*** (0.544)		-3.320*** (0.254)	-3.115*** (0.262)	-2.959*** (0.271)
Female		-1.592*** (0.496)	-1.261** (0.523)	-1.411*** (0.541)		-1.388*** (0.217)	-1.342*** (0.222)	-1.412*** (0.229)
Race of Student								
Asian/Pacific Islander		2.858*** (0.664)	2.729*** (0.972)	2.824*** (0.996)		-1.201 (1.322)	-1.315 (1.344)	-1.424 (1.418)
Black or African American		-4.354*** (1.285)	-2.379* (1.251)	-1.371 (1.343)		-7.044*** (0.398)	-6.104*** (0.428)	-4.777*** (0.466)
Hispanic		-3.408*** (0.670)	-3.289*** (1.018)	-3.151*** (1.071)		-3.504*** (0.517)	-3.506*** (0.547)	-3.163*** (0.556)
Mixed Race		1.219 (0.947)	0.802 (1.116)	0.656 (1.196)		-3.206*** (0.581)	-2.926*** (0.607)	-2.519*** (0.599)
Mother's Age		0.052 (0.039)	0.055 (0.043)	0.053 (0.044)		0.057** (0.023)	0.054** (0.023)	0.045* (0.024)
Mother's Highest Level of Education								
Some College		2.519*** (0.695)	1.941** (0.760)	1.821** (0.781)		1.584*** (0.293)	0.990*** (0.309)	0.882*** (0.321)
College Degree		2.594*** (0.804)	1.131 (0.862)	1.162 (0.920)		3.402*** (0.357)	2.291*** (0.392)	2.151*** (0.409)
Graduate or Professional Degree		3.260*** (1.077)	1.306 (1.177)	1.821 (1.186)		4.388*** (0.438)	3.111*** (0.471)	3.243*** (0.492)
Father's Highest Level of Education								
Some College		2.020*** (0.709)	1.165 (0.786)	0.564 (0.820)		2.155*** (0.301)	1.655*** (0.318)	1.568*** (0.328)
College Degree		3.226*** (0.817)	2.340** (0.929)	2.260** (0.976)		4.084*** (0.358)	3.014*** (0.386)	2.675*** (0.396)
Graduate or Professional Degree		7.537*** (0.867)	5.002*** (1.002)	4.528*** (1.067)		5.266*** (0.398)	3.495*** (0.447)	3.273*** (0.460)
Father's Work Hours		0.027* (0.014)	-0.012 (0.016)	-0.012 (0.016)		0.022** (0.009)	0.010 (0.010)	0.006 (0.010)
<b>Immigration Background</b>								

Mother is an Immigrant	-1.494**	-1.466*		
	(0.722)	(0.753)		
Mother's Native Language				
Spanish	1.240	1.470		
	(1.029)	(1.077)		
Other European Language	2.217	2.393		
	(1.479)	(1.570)		
West or South Asian Language	-0.865	-0.638		
	(1.311)	(1.390)		
Pacific or Southeast Asian Language	2.330**	2.006*		
	(1.015)	(1.054)		
Other Language Group	-2.340	-2.523		
	(1.558)	(1.613)		
Mother is Fluent in English	-0.340	-0.858		
	(0.905)	(0.938)		
<b>Additional Student and Household Characteristics</b>				
Annual Household income	0.000**	0.000**	0.000***	0.000**
	(0.000)	(0.000)	(0.000)	(0.000)
Number of Siblings	-0.884***	-0.688**	-0.154	-0.087
	(0.200)	(0.210)	(0.096)	(0.101)
Mother's Occupation				
Clerical	-0.502	-0.803	0.613*	0.618*
	(1.158)	(1.247)	(0.340)	(0.349)
Operative/Crafts	-2.846***	-3.014***	-0.457	-0.233
	(0.748)	(0.779)	(0.382)	(0.388)
Farmer/Laborer	-3.015***	-2.751***	-0.495	-0.663
	(0.964)	(1.002)	(0.691)	(0.700)
Service/Household	-1.908*	-2.133**	-0.205	-0.280
	(1.011)	(1.046)	(0.393)	(0.408)
Military/Protective Services	-2.871	-2.066	-2.796***	-2.304***
	(1.746)	(1.908)	(0.815)	(0.842)
Sales	-0.548	-0.131	-0.273	-0.032
	(1.273)	(1.314)	(0.511)	(0.526)
Grandparents' Highest Level of Education				
Some College	0.474	0.805	0.551*	0.566*
	(0.885)	(0.908)	(0.310)	(0.322)
College Degree	1.191	1.384*	0.839***	0.785**
	(0.777)	(0.821)	(0.323)	(0.334)
Graduate or Professional Degree	1.374	0.908	1.744***	1.408***
	(0.884)	(0.948)	(0.369)	(0.380)
<b>School and Educational Characteristics</b>				

More than 50% Eligible for Free Lunch				-0.196 (0.841)					-2.032*** (0.454)
School Type									
Catholic				-0.299 (0.743)					0.022 (0.296)
Private, not Catholic				-0.281 (0.998)					0.927** (0.379)
Student held job for pay during school year				0.999 (0.643)					-0.023 (0.246)
Student attended day care program				-0.178 (0.651)					-0.842*** (0.260)
Student attended nursery/pre-school				1.511** (0.679)					0.719** (0.281)
Student attended Head Start program				0.236 (0.747)					-2.640*** (0.466)
Student attended kindergarten				-0.294 (1.739)					-1.415* (0.758)
Constant	51.320*** (0.755)	89.194*** (8.310)	91.550*** (8.862)	87.761*** (9.220)	53.732*** (0.296)	101.050*** (4.229)	99.635*** (4.340)	99.228*** (4.537)	
Observations	1294	1234	1068	1068	5791	5659	5304	5304	

Notes: Robust standard errors reported in parentheses. Scores are standardized to have a mean of fifty and standard deviation of ten. Indicators (not reported) for missing values are used to preserve sample sizes.

<sup>1</sup> Reference group is mothers who are not working

\*  $p < 0.1$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$



**Appendix Table A4: Full Results-OLS Estimates Predicting High School GPA**

	Second Generation Immigrants				Native to U.S.			
	(1)	(2)	(3)	(4)	(1)	(2)	(3)	(4)
<b>Maternal Employment<sup>1</sup></b>								
Part-Time	0.001 (0.098)	-0.055 (0.085)	-0.102 (0.089)	-0.125 (0.098)	0.074** (0.030)	0.047* (0.028)	0.045* (0.027)	0.052* (0.029)
Full-Time	-0.064 (0.059)	-0.091* (0.052)	-0.096* (0.055)	-0.126** (0.059)	-0.031 (0.025)	-0.002 (0.023)	-0.008 (0.024)	-0.009 (0.025)
<b>Basic Student and Household Characteristics</b>								
Age of Student		-0.227*** (0.041)	-0.201*** (0.044)	-0.181*** (0.047)		-0.175*** (0.022)	-0.160*** (0.023)	-0.153*** (0.024)
Female		0.308*** (0.039)	0.331*** (0.041)	0.308*** (0.044)		0.247*** (0.017)	0.246*** (0.018)	0.243*** (0.018)
Race of Student								
Asian/Pacific Islander		0.189*** (0.054)	0.094 (0.079)	0.099 (0.086)		-0.057 (0.097)	-0.047 (0.102)	-0.067 (0.113)
Black or African American		-0.266*** (0.100)	-0.211* (0.112)	-0.133 (0.117)		-0.481*** (0.036)	-0.421*** (0.038)	-0.354*** (0.042)
Hispanic		-0.167*** (0.056)	-0.121 (0.075)	-0.074 (0.077)		-0.260*** (0.042)	-0.279*** (0.044)	-0.246*** (0.046)
Mixed Race		0.108 (0.069)	0.090 (0.079)	0.119 (0.084)		-0.235*** (0.046)	-0.238*** (0.046)	-0.224*** (0.046)
Mother's Age		0.004 (0.003)	0.005 (0.003)	0.005 (0.004)		0.005*** (0.002)	0.006*** (0.002)	0.004** (0.002)
Mother's Highest Level of Education								
Some College		0.138** (0.055)	0.082 (0.061)	0.103 (0.064)		0.086*** (0.024)	0.060** (0.025)	0.067** (0.026)
College Degree		0.113* (0.059)	0.028 (0.066)	0.041 (0.070)		0.239*** (0.028)	0.195*** (0.030)	0.186*** (0.031)
Graduate or Professional Degree		0.153** (0.076)	0.017 (0.086)	0.017 (0.090)		0.304*** (0.032)	0.257*** (0.035)	0.270*** (0.036)
Father's Highest Level of Education								
Some College		0.160*** (0.060)	0.120* (0.068)	0.106 (0.073)		0.077*** (0.025)	0.061** (0.026)	0.047* (0.027)
College Degree		0.243*** (0.063)	0.184** (0.074)	0.176** (0.079)		0.199*** (0.028)	0.171*** (0.030)	0.156*** (0.032)
Graduate or Professional Degree		0.533*** (0.063)	0.425*** (0.080)	0.422*** (0.086)		0.280*** (0.030)	0.236*** (0.034)	0.226*** (0.035)
Father's Work Hours		0.001 (0.001)	-0.000 (0.001)	-0.000 (0.001)		0.002** (0.001)	0.001 (0.001)	0.001 (0.001)
<b>Immigration Background</b>								

Mother is an Immigrant	-0.034 (0.057)	-0.020 (0.061)		
Mother's Native Language				
Spanish	0.008 (0.076)	-0.038 (0.082)		
Other European Language	0.089 (0.134)	0.142 (0.142)		
West or South Asian Language	0.070 (0.095)	0.021 (0.107)		
Pacific or Southeast Asian Language	0.169** (0.078)	0.163* (0.083)		
Other Language Group	-0.080 (0.111)	-0.109 (0.121)		
Mother is Fluent in English	0.064 (0.074)	0.067 (0.077)		
<b>Additional Student and Household Characteristics</b>				
Annual Household income	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)
Number of Siblings	-0.057*** (0.017)	-0.053*** (0.018)	-0.008 (0.008)	-0.005 (0.008)
Mother's Occupation				
Clerical	-0.121 (0.085)	-0.110 (0.093)	0.047* (0.028)	0.048* (0.028)
Operative/Crafts	-0.037 (0.063)	-0.076 (0.068)	-0.125*** (0.033)	-0.113*** (0.035)
Farmer/Laborer	-0.094 (0.083)	-0.135 (0.086)	-0.013 (0.052)	-0.020 (0.053)
Service/Household	-0.067 (0.086)	-0.110 (0.091)	-0.030 (0.033)	-0.025 (0.034)
Military/Protective Services	-0.238 (0.174)	-0.206 (0.180)	-0.055 (0.066)	-0.036 (0.071)
Sales	-0.070 (0.097)	-0.073 (0.099)	-0.062 (0.043)	-0.058 (0.045)
Grandparents' Highest Level of Education				
Some College	-0.008 (0.074)	-0.046 (0.075)	0.011 (0.024)	0.012 (0.025)
College Degree	0.115** (0.055)	0.117** (0.059)	-0.002 (0.026)	-0.007 (0.027)
Graduate or Professional Degree	0.056 (0.066)	0.023 (0.073)	0.029 (0.029)	0.005 (0.030)
<b>School and Educational Characteristics</b>				

More than 50% Eligible for Free Lunch				0.016 (0.071)				0.046 (0.040)
School Type								
Catholic				0.089 (0.057)				-0.015 (0.023)
Private, not Catholic				0.060 (0.074)				0.037 (0.027)
Student held job for pay during school year				0.006 (0.053)				-0.012 (0.020)
Student attended day care program				-0.115** (0.053)				-0.018 (0.020)
Student attended nursery/pre-school				0.049 (0.055)				0.005 (0.023)
Student attended Head Start program				-0.044 (0.065)				-0.242*** (0.040)
Student attended kindergarten				-0.009 (0.158)				-0.021 (0.067)
Constant	2.845*** (0.054)	5.869*** (0.669)	5.585*** (0.735)	5.321*** (0.806)	2.944*** (0.022)	5.178*** (0.366)	5.058*** (0.377)	5.054*** (0.402)
Observations	1224	1166	1010	1010	5419	5280	4955	4955

Notes: Robust standard errors reported in parentheses. High School GPA is the student's cumulative GPA from 9<sup>th</sup> through 12<sup>th</sup> grade.

Indicators (not reported) for missing values are used to preserve sample sizes.

<sup>1</sup> Reference group is mothers who are not working

\*  $p < 0.1$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$