

An empirical analysis of informal human capital investments in adolescence as a predictor of life outcomes

by

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B.S., West Texas A&M University, 2002

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AN ABSTRACT OF A DISSERTATION

submitted in partial fulfillment of the requirements for the degree

DOCTOR OF PHILOSOPHY

Department of Personal Financial Planning  
College of Human Sciences

KANSAS STATE UNIVERSITY  
Manhattan, Kansas

2019

## Abstract

Human capital theory is used to predict life outcomes; it also examines an individual's economic value, how to increase that value, and when the return on the investment in human capital no longer exceeds the investment cost (Becker, 1985; Weiss, 1995). Human capital investments are defined as any investment of time, money, or both that can change the economic value of the individual. This dissertation further distinguishes between *formal* and *informal* human capital investments. One of the most common formal investments in research literature uses higher education to predict future or expected earnings. Informal human capital investments are viewed here as those investments made outside a structured educational environment. Formal investments in human capital have been investigated globally using large samples with strict controls for potentially influencing variables, and the results consistently suggested that those with a college education receive greater lifetime earnings than those with no college education. Indeed, with factory jobs disappearing, a college education is often a required qualification to apply for a job today.

Little research, however, has been done to investigate the potential impact of informal human capital investments. The purpose of this study was to investigate the potential impact of informal human capital investments made outside of the K-12 curriculum required for youth in the United States of America. Using longitudinal data from the National Longitudinal Study of Youth 1997, this study examined the potential impact of three informal human capital investments made in adolescence on four life outcomes for those youths. Informal human capital investments outside of the classroom were measured by (1) the minutes youths spent reading for pleasure, (2) taking extra lessons, or (3) watching television. The four life outcomes examined were (1) educational attainment, (2) wages, (3) employment status, and (4) cognitive ability. The

data were analyzed using several hierarchical regressions to assess the impact of these informal human capital investments made in adolescence.

The results showed that time spent reading for pleasure as an adolescent was statistically significantly and positively associated with educational attainment, increased cognitive ability, and likelihood of being employed, but was statistically significantly and negatively associated with slightly lower wages. Investing in informal human capital through extra lessons was statistically significantly and positively associated with educational attainment, employment, and cognitive ability. Watching television was statistically significantly and negatively associated with educational attainment and cognitive ability, but was statistically significantly and positively associated with wages when including respondents with zero hours worked.

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## Acknowledgements

So many people have helped me throughout the doctoral degree and in completing this dissertation. My parents instilled a strong work ethic and demonstrated the importance of continuing to learn through their example. They started me on the path of knowledge and it's been a great path for me and I want to thank them for the life they gave me.

I want to thank my entire committee for their service on this dissertation committee. I first want to thank my advisor and co-chair, Dr. Stuart Heckman. He was a great supporter throughout the dissertation process, patiently answering questions and guiding me to additional resources to improve my understanding. I also want to thank the other co-chair, Dr. Kristy Archuleta for making the time to help even through her transition to a new role at the University of Georgia and pages of written feedback, most of which was legible. I especially want to thank Dr. Martin Seay for the regular check-ins to keep me on track along with the occasional threat of violence to spur me along. I want to thank Dr. Philippe Belley for his willingness to serve outside of his department for a student he never met before the request. His comments at the proposal were what brought an additional dependent variable, cognitive ability, into the study.

Throughout the doctoral program, I have been fortunate to have a supportive cohort. I especially want to thank my 'Dissertation Support Group' (previously the Prelim Study Buddies) consisting of myself, Gloria Preece, and Greg Schinck. The regular meetings and their support made a huge difference.

# Chapter 1 - Introduction

## Background

Human capital investments can be used to predict many life outcomes including educational attainment, cognitive ability, wages, and employment status (Becker, 1962, 1975; Meisenberg & Lynn, 2011). Education is often used as a human capital investment to predict wages and employment. Investments in human capital increase individuals' abilities to produce goods and services that provide people with higher wages and more employment options (Becker, 1962; J. Mincer, 1958). A person with a goal of higher wages and increased employability can strategically invest in certain components of human capital that have a greater impact on wages and employability (Baum, Ma, & Payea, 2010). A college education is one of the earliest times when people have the ability to choose to make formal human capital investments. In the US, the K-12 educational system is mandatory, while a college education is a choice. Approximately 35% of the US population chooses not to attend college (National Center for Education Statistics, 2016).

Researchers have examined human capital investments based on their return rates on specific areas of study (Altonji, Kahn, & Speer, 2014; Carnevale & Cheah, 2013), gender (Reisel, 2013), and school choices (Kingston & Smart, 1990). Researchers have also used formal higher education as the investment in human capital, with income or net worth for the return on that investment and comparing adults with a high school education to those with a college degree (Altonji, Blom, & Meghir, 2012; Card, 1999; Hout, 2012; Psacharopoulos & Patrinos, 2004; Rumberger & Thomas, 1993). The economic returns to investments in higher education have been studied in the academic literature (Altonji et al., 2014; Carnevale & Cheah, 2013).

However, research has also examined the returns to higher education as a risky choice investors make at the cost of foregone wages and opportunities in the marketplace (Altonji et al., 2012).

Informal human capital investments are made outside of any sort of formal training or educational system. There is a growing body of literature on informal human capital investments made in infancy to early childhood (Bray & Lykins, 2012; Hargrave & Sénéchal, 2000; Schellenberg, 2004; Sénéchal, Lefevre, Thomas, & Daley, 1998). However, this research tends to examine only short-term outcomes and focuses primarily on children. The bulk of the available research has explored the impact of reading to and with children, enrolling children in some type of extra lessons, and television viewing habits (Bray, 2006; Duursma, Pan, & Raikes, 2008; Ho, Cheung, & Chan, 2003; Jonsson, 1986). The returns examined are typically educational achievements in the following semester or year (Bray & Lykins, 2012; Hargrave & Sénéchal, 2000; Schellenberg, 2004; Sénéchal et al., 1998), which leaves a gap in the literature.

This study intends to add to the literature by using informal human capital investments made in adolescence to predict life outcomes in early adulthood in education, wages, employment, and cognitive ability. A better understanding of human capital theory as applied to informal investments in adolescence may provide several benefits. Parents and educators may gain knowledge that will aid them in making human capital investments for the children. Adolescents may gain knowledge that will aid them in making informal human capital investment decisions for themselves. This additional understanding advances the understanding of how time spent in early adolescence may be associated with long-term benefits and potentially lead to compounding benefits that increases the wealth of the nation (Smith, 1776).

## Definitions of Terms Used in Study

Below is a list of commonly used terms throughout this dissertation and their corresponding definitions:

*Formal human capital investments*—defined as education or training that is done in an educational institution or training facility. This type of education or training often produces measurable results of its students/participants.

*Informal human capital investments*—defined as education or training that is done outside of any sort of formal training or educational system.

*Investment*—defined as an expenditure of effort, time, and/or money with the anticipation of a gain.

*Human capital*—defined as the talents that comprise part of a person's stock of value (Smith, 1776).

*Human capital investments*—defined as any investment of time, money, or both that can change the marginal productivity of the individual.

*Marginal productivity*—defined as an individual's ability to perform labor that creates economic value (Becker, 1962, 1994; Bryant & Zick, 2006; Schultz, 1961).

*Return*—defined as an increase in economic value above and beyond the cost of the initial human capital investment.

*Stock of value*— defined as an individual's human capital that can be measured directly through aspects such as educational attainment and cognitive ability and can be indirectly measured through aspects such as wages and employment status (Becker, 1962; J. Mincer, 1958; Schultz, 1961).

## **Introduction to Theoretical Framework**

Human capital theory examines an individual's stock of value and how that stock of value relates to marginal productivity (Becker, 1962, 1985; Schultz, 1961; Smith, 1776). A key assumption of human capital theory is the idea that marginal productivity can be increased through human capital investments (Becker, 1962; J. Mincer, 1958; Schultz, 1961). This increased productivity is rewarded by employers through hiring and increased wages (Schultz, 1961).

The sooner a strategic human capital investment is made, the sooner the increase in wages is realized, and the more years the worker receives the increased wages (Ibbotson, Milevsky, Chen, & Zhu, 2007). Thus, one possible calculation of an individual's human capital can be formulated as the present value of an individual's future earnings (Ibbotson et al., 2007). Taking this idea further, even activities such as exercise or dental care that increase longevity and reduce sick days can be viewed as investments in human capital (Kodde, 1986).

The cost of a human capital investment can be viewed as the time and resources required to make the investment. Broadly categorized, people can use their 24 hours in each day to work, play, survive (eat and sleep), or investment in human capital. Time spent in any one category is at the expense of another. Thus, there is an opportunity cost to the human capital investments. Time spent making a human capital investment could have been spent earning wages, playing, or surviving. One way of calculating this cost is to estimate the potential earnings during the time spent on pursuits other than earning wages.

Resources must be devoted to the human capital investment. In addition to lost wages, there might be a financial cost to the human capital investment. Tuition is a direct financial cost of earning college credits. In addition to tuition, students may need to move from home to

attend a university, and housing costs may now be higher. There is also a time and effort cost along with an opportunity cost to earning college credits. These resources add to the total cost of the human capital investment. The total cost of a human capital investment should be balanced against the expected return on the investment (ROI). As with any investment, human capital theory suggests that there is a point at which the return on the investment in human capital no longer exceeds the investment cost (Becker, 1962, 1985; Schultz, 1961).

### **Research Question and Hypotheses**

Theoretically, human capital investments should increase marginal productivity (Becker, 1962). This increase in productivity should lead to improved life outcomes such as increased wages and likelihood of employment (Mincer, 1958; Mincer, 1974). Some improved life outcomes of formal human capital investments in higher education have been studied (Baum et al., 2010; Mincer, 1974). This dissertation adds to the literature by studying the effect of informal human capital investments on several life outcomes as measured in early adulthood.

To do so, this dissertation examined some of the informal human capital investment choices adolescents made outside of the K-12 classrooms. These same adolescents were then tracked as they enter early adulthood to determine the impact those informal human capital investments had on life outcomes. The informal human capital investments made by the adolescents sampled were (1) reading for pleasure, (2) taking extra lessons, and (3) watching television. Reading for pleasure and taking extra lessons are both viewed as positive investments in human capital (Heckman, 2000; Ho et al., 2003). Watching television can provide benefit, but it may depend on content and timing (Jonsson, 1986).

The life outcomes examined were (1) educational attainment, (2) wages, (3) employment status, and (4) cognitive ability. Thus, the broad research question became the following: what was the impact of informal human capital investments made in adolescence on life outcomes?

The hypotheses tested were:

- H<sub>1</sub>: Time spent reading for pleasure as an adolescent will have a positive impact on life outcomes.
- H<sub>2</sub>: Time spent on extra lessons as an adolescent will have a positive impact on life outcomes.
- H<sub>3</sub>: Time spent watching television will have a negative impact on life outcomes.

### **Data**

The National Longitudinal Survey of Youth (NLSY97) is a nationally representative sample of respondents born between 1980 and 1984 (Bureau of Labor Statistics, 2017a). The cohort was first surveyed during adolescence in 1997 (Bureau of Labor Statistics, 2017a). The NLSY97 surveyed the cohort annually to gather a variety of information designed to examine the transition from adolescence to adulthood (Bureau of Labor Statistics, 2017b). Information gathered covers education, workforce participation, and household data (Bureau of Labor Statistics, 2017a). The questions asked allowed insight into the impact informal human capital investments made in adolescence had on key life outcomes.

## Summary

Researchers have used human capital theory to examine the return on investment choices people make in their human capital. Every person has an expected lifetime earning ability that can be calculated. This calculation is often done by determining expected wages over a lifetime and discounting that amount back to present value (Ibbotson et al., 2007). This present value is the person's human capital. By adjusting the inputs of the calculation, human capital can be changed. Increasing wages and time spent earning increases the present value of human capital. To increase wages and employability, people can improve skills that are valued in the marketplace. Education is a noted value in the employment marketplace (Hout, 2012). The cost of the human capital investments are the resources required to make the human capital investment. If the cost of the human capital investment does not exceed the expected return, human capital theory suggests that the human capital investment should not be made.

During college, people can make a strategic human capital investment by choosing certain schools and certain majors. Certain college degrees such as engineering have historically provided a greater return than degrees in philosophy (Berger, 1988; Rumberger & Thomas, 1993). During the K-12 years, the formal education investment choices are extremely limited. Outside of the K-12 classrooms, however, informal human capital investments come with much more freedom of choice. These informal human capital investment choices should be given consideration.

Human capital theory postulates that investments made in an individual result in increased marginal productivity, which results in increased wages. Research in human capital theory has tended to focus on formal investments made through a college education. This study was unique in that it analyzed the effect of informal human capital investments on more than just

wages to examine four key life outcomes. Informal human capital investments were measured by (1) the minutes youths spent reading for pleasure, (2) taking extra lessons, or (3) watching television. The four life outcomes examined were (1) educational attainment, (2) wages, (3) employment status, and (4) cognitive ability. By focusing on informal human capital investments, this study advanced the literature by improving our understanding of how informal human capital investments made in adolescence impact life outcomes.

## **Chapter 2 - Literature Review**

In order to advance the literature on human capital theory, a thorough review must be done on the existing literature and how human capital has been studied. Human capital incorporates all aspects of an individual that cannot be separated from that individual the way physical assets or financial assets could be separated (Becker, 1994). This stock of human capital can be examined in several different ways. This dissertation examined the effect of informal human capital investments on life outcomes by tracking time spent in adolescence reading for pleasure, taking extra lessons, and watching television.

The literature review begins with the theoretical framework and posits hypotheses based on the theoretical framework. Relevant literature and findings associated with the theoretical framework and the dependent variables were discussed. Next, the literature review examined the three variables of interest; (1) reading for pleasure, (2) taking extra lessons, and (3) watching television. These variables are viewed as informal investments in human capital during adolescence, and literature illustrating such was discussed. Next, the literature review examined the four life outcomes, which are (1) higher education, (2) wages, (3) employment, and (4) cognitive ability.

### **Theoretical Framework**

The combined value of each individual citizen comprises a part of the wealth of the nation; thus, investments in human capital should increase this wealth (Smith, 1776). These investments were defined as the costs required to acquire education, study, or obtain apprenticeships (Smith, 1776). As research interest grew in the area of human capital, its composition became more measurably defined. Adam Smith's (1776) concept of human capital

was elaborated upon to incorporate measurable metrics using aspects of human capital such as knowledge, health, and personality (Becker, 1994; J. Mincer, 1958; Schultz, 1961).

As previously stated, investments in human capital increase marginal productivity and increased marginal productivity is rewarded in the employment marketplace with greater employability and increased wages (Becker, 1994; J. Mincer, 1958). Education and training were some of the first measurements of human capital with wages used (Becker, 1962) as the return on that human capital investment. (J. Mincer, 1958). A person's stock of human capital is impacted by human capital investments made by that person. Each investment incurs a time cost and possibly a direct financial cost. The time cost is the opportunity cost of time that could be spent earning wages, engaging in leisure activities, surviving, or investing in other avenues of human capital. The direct financial cost can be dollars spent on tuition or materials needed to make the human capital investment.

Human capital theory (HCT) assumes that all investments in human capital provide a positive but diminishing marginal return thus the individual would (or should) make human capital investment decisions based upon the expected return (Becker, 1962; J. Mincer, 1958). The total stock of value thus consists of the aggregation of available choices made by the individual (Bowles & Gintis, 1975). Because there is a diminishing marginal return, there is a point where the cost of the investment exceeds the return.

According to the time value of money, the more time there is to receive future earnings and the higher the future earnings, the greater the present value of those earnings. Therefore, human capital investments early in the life cycle should generate higher future earnings as well. Investments in health are correlated with higher longevity; thus exercising, dental care, and meditating are expected to provide individuals with more years of earnings. Investments in

education and skills that are valued by employers are correlated with higher earnings, thus increasing the present value of future earnings. Upon delving further into the time value of money and evaluating present value of net worth rather than income, the cash flow of an individual can be clearly seen. Spending (other than on investments in human capital) would decrease net worth, and thus the present value. Windfalls would increase present value, although expected windfalls might increase the current outflows of the individual based on the expectation with the individual attempting to smooth consumption.

Profit-maximizing employers attempt to recruit and retain workers that provide the best return on the employers' costs of employment. Those employers attempt to value potential applicants through a hiring process that examines multiple factors expected to contribute to the productivity of the applicant. These factors were viewed as investments in human capital. To illustrate human capital investments in the workforce, a school supply store hiring seasonal workers is used as an example. A profit-maximizing employer would hire seasonal employees only if the cost of wages was less than the employer's profits. Becker (1962) modeled this idea in equilibrium as

$$MP_t = W_t$$

where MP equals the marginal product (revenue), W equals the wages, and t represents the specific summer time period used in the illustration. The t is necessary because the back-to-school period was most likely to be different in terms of both MP and W due to increased purchases by purchasers preparing for the school year and the increased wages paid to the temporarily increased workforce. Employers invest in employee training only if the cost of the training was less than the expected return.

Investments in human capital can be of time or money, and the investment can be specific (e.g., an advanced robotics course) or general (e.g., a freshman-level English course). If it is further assumed that the goal of these human capital investments is to increase marginal productivity, then there must be a point where the return on that investment no longer is profitable from a purely financial point of view. Empirical studies have been conducted on human capital investments such as education (Altonji et al., 2012), health (Grossman, 1972), and investing in the quality of children (Becker & Lewis, 1974). Income for those with more education is almost always above the national average (Baum et al., 2010; Becker, 1994).

The positive correlation between education and human capital has been accepted and encouraged in the US as demonstrated by the obligatory schooling up to grade 12. Much of the children's mental development comes from publicly-funded education. Beginning in the mid-nineteenth century, elementary and secondary schools in the US were forgiving of failure (at least until recently mandated standardized exams) and publicly funded to make entry open to everyone (Goldin, 2016). The substantial financial investment in the K-12 curriculum was provided by the US federal government, with states spending \$634 billion for the 2013-14 school year (US Department of Education, 2017). Because quality differences exist in school districts, some families can and will exercise choice when moving to find a home in an area with better schools (Goldin, 2016). Families also have the option of sending their children to private schools at their own expense or home schooling their children. Minimum standards, set by democratically elected representatives, are applied to all options legally available to families. Once the obligatory period ends, the students are free to choose their paths. At this point, most of the students are 18 years old and legally considered an adult. The substantial time cost, however, was a burden placed upon the student.

Outside of basic survival needs such as eating and sleeping, time use can be divided into three broad categories: work, leisure, and school (Bryant & Zick, 2006). This means that any time spent in one category is at the expense of time that could be spent in another category. Note that some activities could fit multiple categories. Gym class, for example, might be part of the school category and the leisure category. Children have few options in the work category. However once they reach the ninth grade, half of them have some sort of part-time job during the school year (National Center for Educational Statistics, 2012). High school takes up an average of 34 hours per week during the school year with a nearly an additional seven hours spent working on homework (National Center for Education Statistics, 2016; National Center for Education Statistics, 2004). There is also a recommended eight to ten hours of sleep per night (Hirshkowitz et al., 2015), although adolescents tend to get less sleep than recommended (Wolfson & Carskadon, 1998).

Informal human capital investments outside of the school system come at the expense of leisure time. This expense highlights the need to put thought into the choice of informal human capital investments. The adolescents' informal human capital investment choices in reading, extra lessons, and watching television are the predictor variables of interest in this study.

The impact of reading on development has been studied throughout the human lifespan. During the formative years, reading has been associated with language acquisition, literacy development, reading comprehension, and educational success (Heckman, 2000). Educational success has been associated with greater earnings (Hout, 2012), which highlights the need to control for education in this study. As senior citizens, regular readers are less likely to be diagnosed with Alzheimer's disease (Wilson et al., 2002). Books are available for free at public libraries; thus the financial cost of the investment can be minimal. Internet access also opens up a

multitude of free classics on both the Gutenberg Project and Amazon Kindle. The investment cost of reading is primarily one of time.

Extra lessons outside of the mandated school system represent a focused informal investment in human capital. These lessons could be in music, algebra, soccer, or any number of areas. The delivery can be flexible, through private lessons with individualized attention or in group sessions (Dang & Rogers, 2008). Extra lessons in various areas have been linked to increased intelligence and academic performance (Hurwitz, Wolff, Bortnick, & Kokas, 1975; Schellenberg, 2004). Unlike reading, extra lessons come with a cost; thus, not all children have families who can afford the cost of extra lessons. The investment cost of extra lessons includes time and money.

Television watching provides an easily accessible form of entertainment and potential educational benefit, depending on the content. Research examining the television watching habits of children found that low achievers substituted learning with time in front of a television, while high achievers used television programs to enhance learning (Jonsson, 1986). In other research, individuals spending more time watching television also tended to be more anxious (Gerbner, Gross, Morgan, Signorielli, & Shanahan, 2002). Television watching, like reading, comes at a minimal financial cost. Even low-income households are likely to have a television. In the US, 99% of households in 1997 had at least one television (US Energy Information Administration, 2017), and several stations including FOX, PBS, NBC, and ABC are available without a subscription. Cable and satellite providers charge a monthly subscription fee for access to more channels. More recently offerings such as streaming services, available via internet access, offer more on-demand viewing access, albeit with the cost of the internet service and potentially a subscription.

In the US, the average viewing time was almost five hours per day in 2005 (Germany, 2005). Another report including tablets and video games and found that up to seven hours per day was spent in front of one or more of those screens (Roberts, Foehr, & Rideout, 2005). By age 70, research has shown that the average has person spent seven to ten years watching television (Strasburger, 1993). Television content viewed is not known in this study, but generally television has been associated with negative outcomes. This time spent was time that could be used investing in human capital in some form by learning something useful. Time, in addition to the financial cost of the television and electricity, were the minimum costs of watching television. The financial costs increased for households choosing to incur the financial cost of ongoing cable, satellite, or streaming service subscriptions.

### **Hypotheses**

Based on the theoretical framework and illustrated in Table 1, the hypotheses to be tested are as follows:

- H<sub>1</sub>: Time spent reading for pleasure as an adolescent will have a positive impact on life outcomes.
- H<sub>2</sub>: Time spent on extra lessons as an adolescent will have a positive impact on life outcomes.
- H<sub>3</sub>: Time spent watching television will have a negative impact on life outcomes.

Table 1  
Summary of Hypotheses for Informal HCI Predicting Life Outcomes

Informal HCI	Education	Wages	Employment	Cognitive ability
--------------	-----------	-------	------------	-------------------

Read	+	+	+	+
Extra lessons	+	+	+	+
Television	-	-	-	-

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### **Informal Investments in Human Capital**

The literature review of informal investments in human capital exams was organized by the three activities examined: reading, extra lessons, and watching television. The literature was discussed in terms of early years (before age eight) and adolescence because the literature shows that the impact was different depending on the age at which the individual was engaged in the activity.

#### **Reading**

**Early years.** Informal human capital investments often begin at home. For example, book reading has been linked to vocabulary growth (Raikes et al., 2006). Researchers found a “reciprocal and snowballing relationship between maternal book reading and children’s vocabulary” development in children under age three (Raikes et al., 2006). During ages two to five years old, paternal book reading at home was found to be a predictor of language development outcomes (Duursma et al., 2008). If the father had at least a high school education, book reading was also a predictor of cognitive development (Duursma et al., 2008).

Informal human capital investment through reading varies by household. Many parents read to their children with 67% of White children and 60% of Asian children sitting down daily to read with parents (National Center for Education Statistics, 2012). In contrast, only 35% of Black children and 37% of Hispanic children were able to count on daily reading sessions (National Center for Education Statistics, 2012).

Children in two-parent households versus single-parent households were more likely to be read to daily (National Center for Education Statistics, 2012). Maternal education showed another positive relationship with 74% of children whose mothers had earned a bachelor's degree (or better) receiving daily reading time (National Center for Education Statistics, 2012). Higher parental educational attainment also made it more likely that children ages three to eleven would spend time reading rather than watching television (Bianchi & Robinson, 1997).

Household income also had a positive relationship with daily reading (National Center for Education Statistics, 2012). Sixty-four percent of households with incomes at 200% or more of the poverty line read to their children daily (National Center for Education Statistics, 2012). The impact of reading to children was especially important for low-income households as an indicator of future success (Rodriguez et al., 2009). Only 40% of households below the poverty line read to their children daily (National Center for Education Statistics, 2012).

Children's first exposure to a formal system of human capital investments usually begins in preschool. Preschool age is typically in a range from three to five years old in the US (Prevention, 2017). Vocabulary acquisition and development is at its highest when children begin school (Anglin, Miller, & Wakefield, 1993). Vocabulary growth is further enhanced with storybook reading where the children are active participants in group reading sessions (Hargrave & Sénéchal, 2000). This vocabulary growth becomes increasingly important as children progress through the mandatory K-12 system, with potential long-term financial consequences. Children's vocabulary levels measured at the beginning of first grade are an excellent predictor of reading ability at the end of that year and again at the end of third grade (Sénéchal et al., 1998).

In 2015, only 36% of fourth graders read at or above proficient reading levels (Nation's Report Card, 2015). These results were compiled by the National Assessment of Educational

Progress (NAEP) and funded by the National Center for Education Statistics (NCES). In this study, Asian students performed at higher levels than all other races with 57% in the fourth grade reading at or above proficient reading levels.

**Adolescent years.** Outside of the reading required at school, time spent reading differs by gender (Hopper, 2005). During adolescence, girls read more than boys as found in a study of 707 adolescents at ages 11-15 with 67% of girls as compared to 54% of boys claiming to be reading books at home (Hopper, 2005). This finding could be due to differing attitudes towards reading. Compared to females, twice as many males see reading as a waste of time at age 15 (Organisation for Economic Co-operation and Development, 2003). Of the 707 adolescents responding in the Hopper (2005) study, 61% overall claimed to be reading books at home and 93% read something other than (or in addition to) books such as magazines or even cereal boxes.

Research has also illustrated gender differences in choice of reading topics. Book choices tend to follow conventional norms with boys choosing stories with adventure and violence, while girls chose romantic themes and animal stories (Sarland, 1991). Magazine choices provide similar conventional choices. Boys tend to read magazines on sports and video games, while girls chose fashion and romance magazines (Benton, 1995).

Unifying both genders came a book series that included adventure, love, violence, and fantastical beasts. *Harry Potter and the Philosopher's Stone* by J.K. Rowling was originally published on June 26, 1997, which coincided with the first year of data collected by the National Longitudinal Survey of Youth in 1997. This book was the most read book by adolescents, followed closely by J.R.R. Tolkien's *Lord of the Rings* (Hopper, 2005). The adolescents in this study may be more likely than others to spend leisure time reading. This combination of access

and popularity may have created, in addition to the human capital benefits of reading, some social capital as well.

According to the testing and results of the National Assessment of Educational Progress (NAEP), an assessment funded by the National Center for Education Statistics (NCES), in 2015, 34% of eighth graders read at or above proficient reading levels (Nation's Report Card, 2015). Asian students continued to perform at higher levels than all other races with 54% at the eighth grade or above proficient reading levels (Nation's Report Card, 2015). These same results also reinforced the idea that girls read more than boys during adolescence (Nation's Report Card, 2015). Research also suggests that there were differences in time spent reading based on race (Nation's Report Card, 2015), household income (National Center for Education Statistics, 2012), and gender (Hopper, 2005).

### **Extra Lessons**

**Early years.** Private tutors had a positive impact on various measures of cognitive ability (Ho et al., 2003; Hurwitz et al., 1975; Schellenberg, 2004). In addition, skills learned in early years create small gains at first that compound to become large gains over time (Becker, 1994). Music lessons have long been linked to increased intellectual development (Ho et al., 2003; Hurwitz et al., 1975). A developmental study providing high-quality private lessons in keyboard, voice, or drama to six year olds supports this idea (Schellenberg, 2004). Measured cognitive ability increased with keyboard and voice lessons, while adaptive social behavior improved with drama lessons (Schellenberg, 2004).

Private tutoring is common in many countries. Almost 90% of elementary school-age children in South Korea and almost 60% of primary school students in West Bengal, India receive some sort of private lessons outside of the school system (Bray & Lykins, 2012; Kim &

Lee, 2010). In the US, private tutors in the early years are less common. The benefits of such tutoring, however, might suggest a need for a parental cost-analysis. Third graders in the US taking remedial tutoring over the summer were able to increase math and reading achievement scores by 12 percent (Jacob & Lefgren, 2004).

**Adolescent years.** Private tutors are more common in the adolescent years. Private tutoring is the norm in some countries (Bray, 2006). Private tutors also had a positive impact on various measures of cognitive ability for adolescents (Bray, 2006; Briggs, 2001; Cheek & Smith, 1998; Jacob & Lefgren, 2004). A study of ninth graders found that those who received private music lessons of any kind performed better on the mathematics portion of the Iowa Tests of Basic Skills (Cheek & Smith, 1998). Slow learners receiving private tutoring were able to maintain a learning pace with their peers (Bray, 2006). High achievers receiving private tutoring were able to achieve more than their high-achieving peers. (Bray, 2006). Private tutoring was also shown to increase Scholastic Aptitude Test (SAT) scores of high school students (Briggs, 2001). Sixth graders taking remedial tutoring over the summer were able to increase math and reading achievement scores by 12 percent (Jacob & Lefgren, 2004).

The benefits of private tutoring in adolescence again suggested a need for a parental cost-analysis. Because these lessons often come at a cost, the recipients of such lessons in this study may come from households with more disposable income. Contrast this with households that have less disposable income to spend on tutors especially over the course of a school year. Families with greater resources and the motivation to bring in private tutors are able to both acquire more tutoring and retain higher quality tutors (Bray, 2006). Households with fewer children, *ceterus paribus* should have more income to devote to their children (Becker & Lewis, 1973)

## **Watching Television**

Exclusive television watching comprises close to 70% of the time spent with the television turned on (J. P. Robinson & Godbey, 1999). Forty percent of adults feel that they watch too much television (Kubey & Csikszentmihalyi, 2002). Seventy percent of adolescents expressed similar sentiments (Kubey & Csikszentmihalyi, 2002).

Those who spend more hours in front of the television report lower life satisfaction and tend to have higher anxiety levels (Frey, Benesch, & Stutzer, 2007). These findings could be partially due to the unrealistic portrayal of life in television. Television depictions of life portray more violence and luxury than real life contains (Lichter, Lichter, & Rothman, 1994). Heavy television viewers also tend to show more anxiety and overestimate crime rates when compared to those who spend less time in front of a television (Gerbner et al., 2002).

For these reasons, television watching is expected to be a negative investment in human capital. However, watching educational content could be beneficial. A Swedish study of six to twelve-year-olds found that high achievers tended to use television programs to enhance learning, while low achievers used television as a substitute for learning (Jonsson, 1986).

**Early years.** Children with highly-educated parents also spent significantly less time in front of the television and more time reading (and studying) as compared to the children of parents with less education (Hofferth & Sandberg, 2001). Thirty-two percent of two to seven year olds have a television set in their bedroom (Roberts, Foehr, Rideout, & Brodie, 1999). Ninety-seven percent of homes with children aged two to seven had television sets with greater than 70% of homes having more than one television set (Roberts et al., 1999). Viewing television is not always a detriment to the well-being of children. A longitudinal study of six year olds

found a negative correlation between screen time and grades for girls, but a positive correlation between screen time and grades with boys (Zimmerman & Christakis, 2005).

**Adolescent years.** Seventy percent of teenagers feel that they watch too much television (Kubey & Csikszentmihalyi, 2002). Sixty-five percent of eight to eighteen year olds have a television set in their bedroom (Roberts et al., 1999). Research has also found a positive correlation between television viewing and alcohol abuse in teens (Anderson, De Bruijn, Angus, Gordon, & Hastings, 2009; T. N. Robinson, Chen, & Killen, 1998). A cross-sectional survey of 4,508 students from fifth through eighth grades found a negative correlation between self-reported weekday television viewing and academic performance, and no relationship between weekend television viewing and academic performance (Sharif & Sargent, 2006). However, in general, television viewing was found to have a negative impact on academic performance (Anderson et al., 2009; Sharif & Sargent, 2006). Little research has found television viewing to be beneficial or resulted in mixed benefits (Jonsson, 1986; Zimmerman & Christakis, 2005).

## **Life Outcomes in Young Adulthood**

### **Educational Attainment**

Early human capital investments have a positive impact on education outcomes. This has been directly studied for short-term outcomes. The positive impact of education on other life outcomes has been embraced by society as illustrated by governmental spending on education. In the US, 92% of the funding for public elementary schools comes from the individual states. The state expenditures totaled \$634 billion in 2013-14 with an average of \$12,509 spent per K-12 student (US Department of Education, 2017). The remaining eight percent of total funding for

elementary and secondary education comes from the US federal government (U.S. Department of Education, 2017).

Higher education levels are linked with benefits on several life outcomes. People with a college degree are more likely to move up in socio-economic status as compared to their parents (Baum et al., 2010). In addition, the government receives more taxes from the high-earning college graduates while paying less in benefits to the graduates as compared to people who did not graduate from college (Baum et al., 2010). This benefit is due to a wide range of positive advantages associated with a college education. People with a college education tend to have higher lifetime earnings (relative to the cost of tuition), are less likely to be unemployed, are more satisfied with their employment, have health insurance, are less likely to smoke or be obese, have greater understanding of political issues, and are more likely to vote (Baum et al., 2010). The positive impact of a college education was especially pronounced for women and minorities (Baum et al., 2010). Globally, each additional year of education provides a 10% rate of return to the individual in the form of earnings (Psacharopoulos & Patrinos, 2004).

Human capital investments are not the only way to influence educational outcomes. Children with parents that are college graduates are more likely to earn a college degree (Ishitani, 2006). Individuals with higher levels of cognitive ability, as indicated by high school grade point average (GPA), are more likely to earn a college degree (Pascarella & Terenzini, 1980). In addition, students who were able to lower the financial cost of an investment in a college degree through financial aid based on academic merit were found to have lower attrition rates (Stampen & Cabrera, 1986).

## **Wages**

Human capital investments have a positive impact on wage outcomes (Becker, 1975; Schultz, 1961). Wages are one of the most studied outcomes of human capital investments. As the theoretical framework illustrates, investments in human capital increase marginal productivity (Becker, 1962). Productivity is valued in the workforce, and those with higher levels of productivity are rewarded with higher wages.

Human capital investments are not the only factors that have an impact on wages. The impact of higher education on wages is well studied (Hout, 2012). Cognitive ability, again one of the other life outcomes examined, has a positive impact on wages (Ceci & Williams, 1997). Cognitive ability, as measured by GPA in secondary school, (Pascarella & Terenzini, 1980) also has an association with earning a college degree. Earning a college degree, as previously noted, has a positive impact on wages (Hout, 2012).

## **Employment Status**

Human capital investments have a positive impact on employment outcomes (Schultz, 1961, 1993). Higher education, a direct measure of human capital, offers many benefits, one of which is a higher rate of employment (Baum et al., 2010). The Bureau of Labor Statistics reported unemployment rates for people aged 25 and over in 2014 at 3.18% for people with Bachelor's degree or higher, 5.43% for people with some college or an Associate's degree, 6% for high school graduates with no college education, and 9% for people with less than a high school diploma. The national unemployment rate for the civilian population in 2014 was 6.2% (Bureau of Labor Statistics, 2014). The data from 2014 correspond to the data from Round 17 examined in this dissertation.

## **Cognitive ability**

Early human capital investments have a positive impact on cognitive ability (Ho et al., 2003; Hurwitz et al., 1975; Schellenberg, 2004). Smarter people tend to earn higher wages than others (Zagorsky, 2007). Wages are paid based on marginal productivity; thus, smarter people should have higher levels of marginal productivity. To that end, cognitive ability has been used as a way to measure the human capital of a country (Meisenberg & Lynn, 2011).

Smarter people also earn higher grades in formal education (Blackwell, Trzesniewski, & Dweck, 2007). Early informal human capital investments should compound going forward, making subsequent learning easier. As discussed above, more formal education should boost marginal productivity, and thus wages.

Human capital investments are not the only way to increase cognitive ability. Cognitive ability can be effected through both environmental factors and genetic factors (Dickens & Flynn, 2001). The nature versus nurture debate has not been settled, but there was general agreement that both factors have an impact on cognitive ability (Dickens & Flynn, 2001). On the genetics or nature research, genetics are thought to have an impact of up to 70% on a child's intellectual development even if that child grows up apart from the child's biological parents (Bouchard, Lykken, McGue, Segal, & Tellegen, 1990). On the environmental or nurture research, more supportive environments with access to proper nutrition, a stable household structure, and high-quality schooling are all linked to higher cognitive ability (Bouchard et al., 1990).

## **Summary**

The literature review covered several concepts as applied to human capital theory. Research on informal investments in human capital tends to focus on educational outcomes. The

first informal human capital investment examined was reading. Reading to young children was linked to vocabulary and language development (Duursma et al., 2008; Raikes et al., 2006). Reading was later associated with educational outcomes (Heckman, 2000). The second informal human capital investment examined was taking extra lessons. Increased cognitive ability and intellectual development are associated with music lessons in young children (Ho et al., 2003; Schellenberg, 2004). Music lessons in adolescence are associated with improved mathematics performance (Cheek & Smith, 1998; Jacob & Lefgren, 2004). Private tutoring in adolescence was associated with improved SAT scores (Briggs, 2001) and reading achievement scores (Jacob & Lefgren, 2004). The third informal human capital investment examined was watching television. The academic impact of young children watching television has been mixed, with lower grades for girls and higher grades for boys (Zimmerman & Christakis, 2005). Adolescents reported that watching television during the week had a negative impact on grades, while weekend viewing had no impact (Sharif & Sargent, 2006).

The literature review also included findings related to several known predictors of life outcomes. Formal education has been heavily studied with the results suggesting a positive impact on employability and wages. Cognitive ability was linked to both successes in higher education and higher wages. Note that the life outcomes are heavily intertwined. A higher level of education gives a person more employment options and access to jobs with higher wages.

This dissertation examines each of the life outcomes separately while controlling for the other life outcomes in each analysis. Most research on *informal* human capital investments examined the impact of informal human capital investments on short-term educational outcomes. These educational outcomes were typically grades or achievement scores. Most research on *formal* human capital investments examined the impact of college education on adult wages.

This study adds to the literature by examining the impact of informal human capital investments on several key life outcomes.

## **Chapter 3 - Methods**

Chapters one and two introduced the research question and the foundation for this study, which included the justification for the research question and the study, the relevance of the research question, and the theoretical framework that drove the hypotheses. In addition, a literature review was conducted to identify the relevant research in the area along with factors that might influence the outcome variables. The theoretical framework suggested that investments in human capital predicted improved life outcomes. The literature review examined some additional variables that have been studied individually in relation to the life outcomes of interest. This chapter describes the research design and methodology used to answer the research question.

### **Data**

The National Longitudinal Survey of Youth (NLSY97) is a publicly available nationally representative panel study of individuals born between 1980 and 1984 collected by the Bureau of Labor Statistics. It was designed to examine the transition of 12 to 16 year olds from early education, workforce participation, and adulthood (Bureau of Labor Statistics, 2017a). The NLSY97 examined a cohort of 8,984 respondents born between 1980 and 1984 and oversampled Blacks and Hispanics at rates of 26% and 21.2%, respectively ( Bureau of Labor Statistics, 2017b). Respondents were first surveyed in 1997, and again each year until 2011; however, that pattern was changed to biennial surveys at that point, with the next survey conducted in 2013. The Round 17, conducted in 2014/2015, is the most recent round of data available with the next release anticipated to be available in 2019.

The longitudinal nature of the dataset allows this study to follow adolescent respondents from an early age into their adult life as they begin careers. In addition to the information on human capital investments made in adolescence, the NLSY97 contains demographic information of the respondents. The NLSY97 also provides extensive information on the family background such as parental income, educational attainment, and marital status. This depth of unique information permits researchers to take into account a variety of factors that the theoretical model and literature review suggest may impact life outcomes.

### **Sample**

The sample analyzed was restricted to respondents who were identified as 12, 13, or 14 years of age on December 31, 1996. These sample criteria were applied because only those respondents were asked the three questions of interest regarding time spent reading for pleasure, taking extra lessons, or watching television. Three of the life outcome variables were measured in the most recent round available, Round 17, which collected educational attainment and employment status information at a time when the respondents were 31, 32, or 33 years old. Wage data from Round 17 reflect income earned in 2014 when the respondents were 30, 31, or 32 years old. The fourth dependent variable, cognitive ability, was measured in Round 3 when the participants are 14, 15, or 16 years old. Round three data were used because the proxy used for cognitive ability, ASVAB percentile scores, was not available in later rounds.

The sample was weighted to account for the oversampling of minority groups in order to create a nationally representative sample for the analysis. The Bureau of Labor Statistics created weights for each year of data collected and weights for any combination of multiple years to correct for the oversampling of minority groups. The NLSY website will create a custom weight for researchers using multiple years of data. Because multiple years were analyzed (1997, 1999,

2008, and 2015) in this study, a custom weight was created for the sample by selecting the corresponding NLSY provided weighting on the NLSY site for the survey years analyzed (i.e., 1997, 1999, 2008, and 2015).

### **Missing Data**

Missing data, depending on the mechanism behind the absence, may introduce bias into multivariate analyses. Missing data can be missing at random (MAR), missing completely at random (MCAR), or missing not at random (MNAR) (Acock, 2005; Allison, 2002). Much of the data missing in this study were missing not at random. This is because the sample was intentionally restricted to include only respondents answering questions on the three predictor variables of interest for all life outcomes analyzed. Respondents aged 15 or older on December 31, 1996 were not asked the three questions used in this study. This reduced the sample size to 5,419 respondents that were 12, 13, or 14 years old on December 31, 1996.

The final sample size varied between analyses. During the analysis of wages, the sample was restricted to exclude respondents working less than 1,000 hours in 2015. During the analysis of employment status, the sample was again restricted to exclude respondents working 0 hours. Primary analyses were conducted with complete cases and sensitivity to missing data were investigated. Using complete cases only may introduce nonresponse bias if those respondents not included in the analyses systematically differ from the respondents included which does not seem to be the case here.

## Measurement of Variables

### Dependent Variables

There were four dependent variables in this study. Education was measured as a binary variable. Cognitive ability and wages were measured as continuous variables. Employment was measured as a continuous variable, using total hours worked. These four dependent variables, each with their own analyses, are elaborated upon below. Specific coding for each analysis can be found in Appendix 1.

The first dependent variable examined was education. Education was measured as a binary variable with '0' representing no college degree and '1' representing a college degree because the interest is in whether respondents earned a college degree or not. In addition, education was measured as a binary variable with '0' representing no high school diploma or GED and '1' representing a high school diploma or GED. This was done because a further question was posed based on the impact of informal human capital investments on an educational outcome that would happen closer in time to the investments made in adolescence. Data for the education variable were gathered from Round 17 (2015 Survey) data when the respondents were 30, 31, or 32 years old.

Annual wages were measured as a continuous variable using the log of annual wages + \$0.01 so that people with an income of \$0 were not dropped from the study. Respondents were asked in Round 17 (2015 Survey) to provide their total earnings from salary or wages in 2014. In 2014, the respondents were 30, 31, or 32 years old. Annual income was used because the theoretical framework suggested that human capital investments increase marginal productivity, which was rewarded in the workplace through increased wages. Net worth might be partially the result of prudent investments, inheritance or other windfalls, or savings rates, and as such may

not provide an accurate rate of return on human capital investments. Wages alone more directly address the needs of the theoretical framework.

Employment status was measured in terms of annual hours worked in Round 17 (2015 Survey), when the respondents were 30, 31, or 32 years old. In Round 17, respondents were asked to self-report hours worked for each week in 2014. To determine annual hours worked, a summated variable was created using the total of the 52 weeks reported. An analysis was done using total hours worked, from zero to 16,535 to include all full cases. A second analysis was conducted excluding respondents with less than 1,000 hours worked. This number was used because 1,000 hours is the minimum amount of hours worked under the Employee Retirement Security Act of 1974 to be eligible to participate in a qualified retirement plan.

Cognitive ability was measured as a continuous variable using Armed Services Vocational Aptitude Battery (ASVAB) percentile scores. This was a timed exam that tests respondents in several areas including general science, arithmetic reasoning, vocabulary, paragraph comprehension, mathematics knowledge, electronics information, automotive and shop information, mechanical comprehension, assembling objects, and verbal expression. These scores are adjusted depending on respondents' age at the time of the test. To do so, the respondents were grouped into three-month age groups with January, February, and March being the first group, April, May, and June, the second, and the third and fourth groups following the same pattern. This pattern continued for each of the three birth years to create a total of 12 groupings. The ASVAB scores were gathered in Round three (1999 Survey), which was the first time these data were available for the sample. ASVAB scores were coded to range from zero to 100 as a dependent variable and zero to 10 when used as a control variable.

## **Independent Variables of Interest**

Time spent reading for pleasure, time spent taking extra lessons, and time spent watching television were the three independent variables of interest. Time was measured in total minutes spent per week during a school week on each of the activities. These three variables of interest came from time use variables asked only in Round 1 (1997 Survey) of the NLSY97. The three key variables of interest were introduced through a series of binary questions coded as 1=*Yes* and 0=*No*, that were phrased as follows:

“In a typical [school week/work week/week], did you spend any time reading for pleasure?”

“In a typical [school week/work week/week], did you spend any time taking extra classes or lessons for example, music, dance, or foreign language lessons?”

“In a typical [school week/work week/week], did you spend any time watching TV?”

Three new variables were created for respondents that answered ‘no’ to the questions to reflect zero minutes on the corresponding activity. Those that answer ‘yes’ were then asked to provide the total minutes spent on the activity during the week and also asked to provide the total minutes spent on the activity over the weekend. Multiple questions were combined to create a summed score of total minutes spent on each informal human capital investment on a weekly basis. These total minutes were converted to hours; thus, 90 minutes would be the equivalent of 1.5 units for the multivariate regression analyses.

## **Respondent Control Variables**

**Personality.** Part of an individual’s human capital is comprised of personality characteristics. One of the ways personality has been studied is through the Big 5 personality traits first suggested in 1943 (Cattell, 1943). The name ‘Big 5’ came about later and was

described more fully to create a common set of traits more easily studied by researchers (Goldberg, 1990; Zillig, Hemenover, & Dienstbier, 2002). The Big 5 personality traits consist of extraversion, agreeableness, openness, conscientiousness, and neuroticism. These traits have been shown to help predict college performance (Wolfe & Johnson, 1995), which in turn can help predict job performance (Barrick & Mount, 1991).

Personality has also been used to predict wages (Duckworth & Weir, 2010). Some personality characteristics have a greater impact on wages than others. One study found that conscientiousness was the most powerful predictor of job performance (Behling, 1998). A meta-analysis further suggests that conscientiousness has the highest validity and impact on predicting job performance (Hurtz & Donovan, 2000). In the same meta-analysis, other traits such as agreeableness and openness to experience had an impact on positions requiring more interpersonal interactions with extraversion influencing sales positions (Hurtz & Donovan, 2000). Conscientiousness was also shown to predict higher levels of wealth and income along with the more subjective concepts of life satisfaction and positive affect (Duckworth, Weir, Tsukayama, & Kwok, 2012). Career success was also related to measures of personality, even after controlling for cognitive ability (Judge, Higgins, Thoresen, & Barrick, 1999).

For the purposes of this dissertation, personality traits were measured in Round 12 (2008 Survey), which was the first time this information was gathered in the NLSY97. Personality traits were measured using the Ten-Item Personality Inventory Scale (TIPI), which asked ten questions that respondents answered on a Likert-type scale measuring from 1 to 7. The ten questions asked the respondent to rate how closely the following pairs of traits applied to them:

1. Extraverted, enthusiastic
2. Critical, quarrelsome

3. Dependable, self-disciplined
4. Anxious, easily upset
5. Open to new experiences, complex
6. Reserved, quiet
7. Sympathetic, warm
8. Disorganized, careless
9. Calm, emotionally stable
10. Conventional, uncreative

**Respondent demographics.** Demographic variables collected include age, gender, race, and education. Age was measured continuously and ranged from 12 to 14 in Round 1 (1997 Survey) and 30 to 32 in Round 17 (2015 Survey), when income data were collected. Gender was measured as (1) for male and (2) for female. Education was measured in Round 17 (2015 Survey) as a categorical variable asking respondents to provide the highest degree received. The education categories were coded as 1 = *GED or high school diploma*, 2 = *a college degree*, and 3 = *a graduate or professional degree*. Race was measured categorically and coded as 1 = *White*, 2 = *Black*, 3 = *Other*. Health was also included, operationalized by using a subjective measure of health from Round 1 (1997 Survey). The subjective measure asked the respondent about their general health. Responses were coded as 1 = *excellent*, 2 = *very good*, 3 = *good*, 4 = *fair*, and 5 = *poor*.

### **Family Background Control Variables**

A household poverty ratio, which compared household income to the federal poverty level for the previous year while taking household size into account, was measured as a continuous variable in Round 1 (1997 Survey). Education was included as a continuous variable,

which was measured in Round 1 (1997 Survey) for the years of education completed by the respondent's parental figures in the household. Parental style, measured in Round 1 (1997 Survey) was included as a categorical variable with responses coded as 1 = *authoritative*, 2 = *authoritarian*, 3 = *neglectful*, and 4 = *permissive*. Responses in two parent households were averaged because research suggests that both parents influence outcomes (Cabrera et al., 2011; Fagan et al., 2014)<sup>1</sup>. This was conducted for the residential parent(s) of the respondent in Round 1. The number of children under the age of 18, measured in Round 1 (1997 Survey) was included as a categorical variable with 1, 2, 3, or 4+ children as the categories. Finally, the age of the respondent's mother at the respondent's birth and at the birth of the mother's first child (information was collected in Round 1) was also included as two separate continuous variables.

### **Empirical Models**

All four dependent variables were analyzed in separate models. Each analysis was done in two stages. The first stage examined the impact of the control variables on the dependent variable being analyzed. The second stage added reading, taking extra lessons, and watching television to the control variables. The interpretation allow some understanding of how much impact the variables of interest have on the dependent variables.

**Educational attainment.** Educational attainment was measured in Round 17 (2015 Survey) as a binary variable. As a dependent variable, respondents were coded as 0 if their educational attainment was less than a college degree or 1 if they earned a college degree or better. As a predictor variable, an additional category was created that combined graduate and professional degrees. This was done to better predict other life outcomes. Logistic regression was

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<sup>1</sup> Parental style is a categorical variable however this estimated effect is not the focus in this dissertation. Here, the continuous coding is used to control for and capture the more permissive households the analyses.

used for the analysis. A base model was used to first examine the control variables, and a second model included the variables of interest.

In addition to earning a college degree or not, education was also measured as a binary variable with earning a high school diploma or GED (HSGED) as a dependent variable. As a dependent variable, respondents were coded as 0 if their educational attainment was less than a HSGED or 1 if they earned an HSGED. As a predictor variable, an additional category was created that combined graduate and professional degrees. This was done to better predict other life outcomes. Logistic regression was used for the analysis. A base model was used to first examine the control variables, and a second model included the variables of interest.

**Wages.** The natural log of wages plus \$.01 was used for analysis. This was done by adding a penny to wages and then taking the natural log of the result in order to create a more normal distribution and not lose the respondents with no wages. Two separate analyses were done, each in the two stages: first with the control variables, and second including the variables of interest previously described. The first OLS analysis looked only at respondents with at least 1,000 hours worked in Round 17 (2015 Survey), and the second included all respondents even if they reported zero hours. The results were similar in both analyses.

**Employment status.** Employment was viewed as total hours worked. Two separate analyses were done, each in the two stages previously described (first with the control variables and second including the variables of interest). The first OLS analysis looked at total hours worked, from 0 to 16,535. The second OLS analysis removed respondents with zero hours to examine only the respondents that had worked. The results were similar in both analyses.

**Cognitive ability.** Cognitive ability was proxied by using the respondents' ASVAB percentile score in Round 2 (1998 Survey). As a dependent variable, the scores ranged from 0-

100 in order to better understand the differing impacts of the variables of interest. As a control variable, the ASVAB scores were scaled to range from 0-10.

### **Summary**

Using the NLSY97, this dissertation creates a restricted sample to analyze the effect of informal human capital investments made in adolescence on four life outcomes. The respondents' informal investments analyzed were time spent during the school year (a) reading for pleasure, (b) taking extra lessons, and (c) watching television. The four life outcomes predicted were (a) educational attainment, (b) wages, (c) employment status, and (d) cognitive ability. Control variables that the theoretical framework and the literature review suggested might also effect the life outcomes examined were used in the analyses as well.

Each life outcome was analyzed in two stages. The first stage predicted the life outcome using only the control variables. The second stage added the three informal human capital investments. The findings and results of these analyses are presented in the next chapter.

# Chapter 4 - Findings and Results

## Research Design and Methodology

This dissertation examined the relationship between informal human capital investments made in adolescence and life outcomes. Human capital theory was used as a theoretical framework to create the empirical models. The empirical models examined the relationship between informal human capital investments made in adolescence (reading for pleasure, taking extra lessons, watching television) and the following life outcomes: educational attainment, cognitive ability, wages, and employment status.

As shown in Table 2, each dependent variable was analyzed in two models with the second model adding the variables of interest.

Table 2

Summary of Regression Analyses for Variables Predicting Life Outcomes

	Model 1	Model 2
Variable		
Controls	x	x
Read		x
Lessons		x
TV		x
$R^2$		

## Descriptive Statistics

Each week in Round 1 (1997 Survey), the adolescents spent an average of 192 minutes reading, 76 minutes taking extra lessons, and 1,127 minutes watching television. As adults the

respondents' highest degrees earned were: 1.2% held professional degrees, .5% earned a PhD, 5.7% earned Master's degrees, 18.9% earned Bachelor's degrees, 8% earned Associate's degrees, while 61.3% had a GED or high school diploma. Adult wages ranged from \$0 to \$212,641, with a mean of \$42,875. In 2014, respondents worked an average of 1,583 hours. ASVAB percentile scores ranged from 0-100 with an average score of 45.4.

The ages and genders were represented evenly. Thirty-four percent were 14 and born in 1982; 33.3% were 13 and born in 1983, and 32.7% were 12 and born in 1984. Fifty-one and six tenths of a percent of the sample were male, and the remaining 48.4 percent were female. Fifty-eight and nine tenths of a percent were White; 26.1% were Black, and 14.1% were categorized as Other. Descriptive statistics for key variables are shown in Table 3.

Table 3  
Descriptive Statistics of Key Variables

Variables	<i>M</i>	<i>SD</i>	Range
Total Read	192.4	512.1	0-13620
Total Lessons	75.9	212.7	0-48000
Total TV	1127.3	956.6	0-13620
Respondent Edu <sup>a</sup>	2.4	1.5	1 - 7
Youth age <sup>b</sup>	13.01	0.816	12-14
Gender <sup>c</sup>	1.48	0.5	1-2
Adult Income	42,874.68	33,726.24	0-212,641

<sup>a</sup>Respondent education: 1 = *GED*, 2 = *high school diploma*, 3 = *Associate's degree*, 4 = *Bachelor's degree*, 5 = *Master's degree*, 6 = *PhD*, and 7 = *professional degree*.

<sup>b</sup>Youth age: 1 = 12, 2 = 13, 3 = 14.

<sup>c</sup>Youth gender: 1 = *male*, 2 = *female*.

## **Multivariate Regression Results**

In this study, four life outcomes were predicted: educational attainment, wages, employment status, and cognitive ability. The predictors of interest were time spent reading, taking extra lessons, and watching television. Each of the four hierarchical regressions and interpretation of results follow below.

### **Educational Attainment**

Two logistic regressions were performed to ascertain the effects of reading, taking extra lessons, and watching television on the likelihood that respondents earn a degree, measured by educational attainment. Educational attainment was measured as a binary variable with respondents categorized based on earning a college degree in the first model. In the second model, respondents were categorized based on earning a high school diploma (or GED) or not. The results of the first analysis are shown in Table 4 below, and the results of the second analysis are shown in Table 5.

The first model, which measured educational attainment based on earning a college degree or not was statistically significant with a Nagelkerke  $R^2$  of 38%. The full model also correctly classified 74.5%. Specifically, not having a college degree was accurately predicted for 80.3% of the cases and having a college degree was accurately predicted for 66.7% of the cases.

Table 4

Summary of Logisitic Regression Analysis for Variables Predicting Earning a College Degree (n = 2430)

Predictor	Model 1			Model 2		
	<i>B</i>	<i>SE B</i>	$e^B$	<i>B</i>	<i>SE B</i>	$e^B$
Age	0.04	0.06	1.04	0.04	0.06	1.04
Gender (M)	0.71	0.11	2.03***	0.68	0.11	1.97***
Race (White)						
Black	-0.41	0.16	0.66*	-0.43	0.16	0.65**
Other	-0.12	0.18	0.89	-0.09	0.19	0.91
HH Poverty Ratio	0.00	0.00	1.00***	0.00	0.00	1.00***
Cognitive ability	0.32	0.02	1.38***	0.32	0.02	1.38***
Subjective Health (Excellent)						
Very Good	-0.10	0.11	0.91	-0.10	0.11	0.91
Good	-0.17	0.14	0.84	-0.16	0.14	0.86
Fair or Poor	-0.16	0.26	0.85	-0.13	0.26	0.88
Res Parent Max Edu	0.13	0.02	1.14***	0.13	0.02	1.14***
Mother - Age Resp Birth	0.05	0.01	1.05***	0.05	0.01	1.05***
Mother - Age First Birth	0.01	0.01	1.01	0.01	0.01	1.01
Extraverted	0.00	0.05	1.00	-0.01	0.05	0.99
Critical	0.04	0.03	1.05	0.05	0.03	1.05
Dependable	0.10	0.06	1.10*	0.10	0.06	1.11*
Anxious	-0.04	0.03	0.96	-0.04	0.03	0.96

Predictor	Model 1			Model 2		
	<i>B</i>	<i>SE B</i>	<i>e<sup>B</sup></i>	<i>B</i>	<i>SE B</i>	<i>e<sup>B</sup></i>
Open	-0.01	0.05	0.99	0.00	0.05	1.00
Reserved	0.02	0.03	1.02	0.02	0.03	1.02
Sympathetic	0.00	0.04	1.00	0.00	0.04	1.00
Disorganized	-0.11	0.03	0.90***	-0.11	0.03	0.90***
Calm	0.09	0.05	1.10**	0.09	0.05	1.11**
Uncreative	0.00	0.03	1.00	0.00	0.05	1.00
Parental Style	0.20	0.05	1.22***	0.20	0.05	1.22***
Number of Children	0.00	0.05	1.00	0.00	0.05	1.00
Reading				0.00	0.01	1.00
Extra Lessons				0.01	0.01	1.01
Watching TV				-0.01	0.00	0.99*
Constant	-7.46	1.09	0.00	-7.34	1.09	0.00
$\chi^2$			804.47			807.68
<i>df</i>			24.00			27.00
Nagelkerke R <sup>2</sup>			0.38			0.38

\**p* < .1. \*\**p* < .05. \*\*\**p*<.01

In the current study, hypothesis 1 stated that time spent reading for pleasure as an adolescent would have a positive effect on life outcomes. The results, while not significant, did show a positive effect on educational attainment. Hypothesis 2 stated that time spent on extra lessons as an adolescent would have a positive effect on life outcomes. The results, while not significant, did show a positive effect on educational attainment. Hypothesis 3 stated that time

spent watching television as an adolescent would have a negative effect on life outcomes. Results for watching television were statistically significant. The results show an additional unit of time spent watching television was associated with .99 times lower odds of earning a bachelor's degree at the  $p < .10$  level.

Several control variables were found to be statistically significant. The model showed that women had 97% ( $p < .10$ ) increase in odds when compared to men to earn a college degree. Respondents that identified as black had 35% ( $p < .10$ ) lower odds to earn a college degree when compared to respondents identifying as white. When predicting educational attainment, the model showed significant results related to the poverty ratio. Those whose household identified as having income was higher than the threshold were slightly more likely to earn a college degree. Cognitive ability was scaled from 0-10 as a predictor variable and respondents identified as having increased cognitive ability were found to have 38% ( $p < .01$ ) higher odds of earning a bachelor's degree. Parental education also had an effect when examining years of education for the household parent with the highest level of education. Each additional year in a parent's education was found to be associated with 14% ( $p < .01$ ) larger odds to earn a college degree for the respondent. The odds of earning a bachelor's degree was 5% ( $p < .01$ ) larger based on the increased age of the respondent's mother when she gave birth to the respondent. Being dependable was associated with 11% ( $p < .10$ ) higher odds of earning a bachelor's degree. Disorganized respondents had 10% ( $p < .01$ ) lower odds of earning a college degree. Odds of earning a college degree were 10% ( $p < .05$ ) larger for respondent's identifying as more calm.

Table 5

## Summary of Logisitic Regression Analysis for Variables Predicting Earning a High School

Diploma (n = 2430)

Predictor	Model 1			Model 2		
	<i>B</i>	<i>SE B</i>	$e^B$	<i>B</i>	<i>SE B</i>	$e^B$
Age	0.09	0.12	0.92	-0.08	0.12	0.92
Gender (M)	0.34	0.20	1.41*	0.27	0.20	1.31
Race (White)						
Black	0.01	0.24	1.01	0.03	0.27	1.03
Other	0.90	0.30	2.45***	0.92	0.30	2.51***
HH Poverty Ratio	0.00	0.00	1.00***	0.00	0.00	1.00***
Cognitive ability	0.47	0.06	1.60***	0.46	0.06	1.59***
Subjective Health (Excellent)						
Very Good	-0.28	0.24	0.76	-0.27	0.24	0.76
Good	-0.24	0.25	0.79	-0.23	0.25	0.80
Fair or Poor	-0.36	0.37	0.70	-0.38	0.37	0.69
Res Parent Max Edu	-0.01	0.02	0.99	-0.01	0.02	0.99
Mother - Age Resp Birth	-0.01	0.02	0.99	-0.01	0.02	0.99
Mother - Age First Birth	0.06	0.03	1.06**	0.06	0.03	1.06**
Extraverted	0.13	0.07	1.14*	0.06	0.03	1.06*
Critical	-0.01	0.06	0.99	-0.01	0.06	0.99
Dependable	0.06	0.09	1.06	0.06	0.09	1.06
Anxious	-0.15	0.05	0.86**	-0.15	0.05	0.86**

Predictor	Model 1			Model 2		
	<i>B</i>	<i>SE B</i>	<i>e<sup>B</sup></i>	<i>B</i>	<i>SE B</i>	<i>e<sup>B</sup></i>
Open	-0.10	0.08	0.91	-0.10	0.08	0.90
Reserved	-0.05	0.05	0.95	-0.06	0.05	0.95
Sympathetic	0.12	0.07	1.13*	0.12	0.07	1.13*
Disorganized	0.01	0.06	1.01	0.01	0.06	1.01
Calm	0.04	0.07	1.04	0.04	0.07	1.04
Uncreative	0.06	0.06	1.06	0.06	0.06	1.06
Parental Style	0.09	0.10	1.09	0.08	0.10	1.08
Number of Children	0.02	0.08	1.02	0.02	0.08	1.02
Reading				0.05	0.03	1.06*
Extra Lessons				0.00	0.04	1.00
Watching TV				-0.01	0.00	0.99
Constant	-0.38	1.91	0.68	-0.36	1.92	0.70
$\chi^2$			264.93			270.95
<i>df</i>			24.00			27.00
Nagelkerke R <sup>2</sup>			0.28			0.29

\**p* < .1. \*\**p* < .05. \*\*\**p*<.01

In the second analyses of educational attainment, hypothesis 1 stated that time spent reading for pleasure as an adolescent would have a positive effect on life outcomes. The results, were positive and significant with respondents who read more having a 6% (*p*<.1) higher odds earning a high school diploma. Hypothesis 2 stated that time spent on extra lessons as an adolescent would have a positive effect on life outcomes. The results, while not significant, did

show a positive effect on educational attainment. Hypothesis 3 stated that time spent watching television as an adolescent would have a negative effect on life outcomes. Results for watching television were not negative but not statistically significant.

Several control variables were found to be statistically significant. Cognitive ability was scaled from 0-10 as a predictor variable and respondents identified as having increased cognitive ability were found to have 59% ( $p < .01$ ) higher odds of earning a high school diploma. The odds of earning a high school diploma was 6% ( $p < .01$ ) larger based on the increased age of the respondent's mother when she gave birth to her first child. Being extraverted was associated with 14% ( $p < .10$ ) higher odds of earning a high school diploma. Sympathetic respondents had 13% ( $p < .01$ ) higher odds of earning a high school diploma.

## **Wages**

The natural log of wages was analyzed as a continuous variable in two separate analyses each with two stages were used. The first analysis includes all respondents, and the second analysis includes a binary variable on whether respondents worked less than 1,000 hours. The results of the first analysis are shown in Table 6 below, and the results of the second analysis are shown in Table 7.

In the first analysis, the variance explained by the base model was 16.8%, and the variance explained by the full model was 18.9%. In both models, several control variables were also significant. Wages were predicted by gender with women earning less than men ( $\beta = -0.14$ ,  $p < .01$ ). Identifying as Other as compared to White ( $\beta = 0.05$ ,  $p < .05$ ) was predictive of increased wages. Having a college degree, as compared to respondents with a high school diploma or less, was predictive of increased wages ( $\beta = 0.13$ ,  $p < .01$ ). Having a graduate degree,

as compared to respondents with a high school diploma or less, was also predictive of increased wages ( $\beta = 0.16, p < .01$ ) in the full model.

Table 6

Summary of Hierarchical Regression Analysis for Variables Predicting Log Adult Wages (n = 1680)

Variable	Model 1			Model 2		
	<i>B</i>	<i>SE B</i>	$\beta$	<i>B</i>	<i>SE B</i>	$\beta$
Age	0.02	0.04	0.01	0.02	0.04	0.01
Gender (M)	-0.48	0.07	-0.17***	-0.41	0.07	-0.14***
Race (white)						
Black	0.01	0.11	0.00	0.00	0.11	0.00
Other	0.21	0.12	0.04*	0.22	0.11	0.04**
HH Poverty Ratio	0.00	0.00	0.04	0.00	0.00	0.03
Resp Education (HS or Less)						
College Degree	0.37	0.08	0.13***	0.38	0.08	0.13***
Graduate Degree	0.68	0.11	0.17***	0.66	0.11	0.16***
Cognitive ability	0.03	0.01	0.06**	0.04	0.01	0.07**
Subjective Health (Excellent)						

Variable	Model 1			Model 2		
	<i>B</i>	<i>SE B</i>	$\beta$	<i>B</i>	<i>SE B</i>	$\beta$
Very Good	-0.17	0.07	-0.06**	-0.16	0.07	-0.05**
Good	-0.16	0.09	-0.05*	-0.17	0.09	-0.05*
Fair or Poor	-0.15	0.17	-0.02	-0.16	0.17	-0.02
Res Parent Max Edu	0.00	0.01	0.00	0.00	0.01	0.00
Mother - Age Resp Birth	0.03	0.01	0.10***	0.02	0.01	0.08**
Mother - Age First Birth	-0.01	0.01	-0.04	-0.01	0.01	-0.03
Extraverted	0.05	0.03	0.04	0.04	0.03	0.04
Critical	-0.01	0.02	-0.01	-0.01	0.02	-0.01
Dependable	0.05	0.04	0.04	0.05	0.04	0.03
Anxious	0.02	0.02	0.03	0.02	0.02	0.02
Open	-0.05	0.03	-0.04	-0.05	0.03	-0.04
Reserved	-0.01	0.02	-0.01	0.00	0.02	0.00
Sympathetic	-0.01	0.03	-0.01	-0.02	0.03	-0.02
Disorganized	0.01	0.02	0.01	0.01	0.02	0.01

Variable	Model 1			Model 2		
	<i>B</i>	<i>SE B</i>	$\beta$	<i>B</i>	<i>SE B</i>	$\beta$
Calm	0.03	0.03	0.03	0.04	0.03	0.03
Uncreative	0.02	0.02	0.02	0.01	0.02	0.01
Hours Worked Weekly	0.02	0.00	0.25***	0.02	0.00	0.33***
Parental Style	-0.02	0.04	-1.01	-0.01	0.03	0.04
Number of Children	0.06	0.03	0.04*	0.06	0.03	0.04*
Reading				-0.03	0.00	-0.17***
Extra Lessons				0.01	0.01	0.03
Watching TV				0.00	0.00	0.03
R <sup>2</sup>			0.17			0.19

\* $p < .1$ . \*\* $p < .05$ . \*\*\* $p < .01$

Hypothesis 1 stated that time spent reading for pleasure as an adolescent would have a positive effect on life outcomes. The results show that each additional hour spent reading was associated with a miniscule decrease in wages of 0.047%. This decrease was significant at the  $p < .01$  level with a  $\beta = -0.17$ .

Hypothesis 2 stated that time spent on extra lessons as an adolescent would have a positive effect on life outcomes. The results, while not significant, did show a positive effect on wages. Hypothesis 3 stated that time spent watching television as an adolescent would have a negative effect on life outcomes. The results, while not significant, did show a positive effect on wages.

Additional variables that were significant included cognitive ability ( $\beta = 0.04$ ,  $p < .05$ ) in the full model. Respondents reporting being in very good health as compared to being in excellent health were predictive on decreased wages ( $\beta = -0.05$ ,  $p < .05$ ) in the full model. Respondents reporting being in good health as compared to excellent health ( $\beta = -0.16$ ,  $p < .10$ ) were also predictive of decreased wages. The age of the respondent's mother when she gave birth to the respondent was predictive of increased wages ( $\beta = 0.02$ ,  $p < .05$ ). Compared to a high school diploma, respondents with a college degree ( $\beta = 0.16$ ,  $p < .01$ ) or graduate degree ( $\beta = 0.07$ ,  $p < .05$ ) tended to earn higher wages. Unsurprisingly, hours worked were also predictive of increased wages ( $\beta = 0.02$ ,  $p < .01$ ).

To further examine the factors, a second analysis was performed with respondents that worked less than 1,000 hours excluded. The results, shown in Table 7, were very similar with only a few minor differences. The second analysis used the same control variables as the first analysis.

In the second model shown in Table 7, the variance explained by the base model was 20%, and the variance explained by the full model was 21%. In both models, several control variables were also significant. Wages were predicted by gender with women earning less than men ( $\beta = -0.44$ ,  $p < .01$ ). Identifying as Other as compared to White ( $\beta = 0.24$ ,  $p < .10$ ) was predictive of increased wages. Having a college degree, as compared to respondents with a high school diploma or less, was predictive of increased wages ( $\beta = 0.38$ ,  $p < .01$ ). Having a graduate degree, as compared to respondents with a high school diploma or less, was also predictive of increased wages ( $\beta = 0.67$ ,  $p < .01$ ) in the full model. Cognitive ability was also a significant predictor of increased earnings ( $\beta = 0.04$ ,  $p < .01$ ).

Table 7

Summary of Hierarchical Regression Analysis for Variables Predicting Log Adult Wages with 1,000 + Hours Worked (n = 1680)

Variable	Model 1			Model 2		
	<i>B</i>	<i>SE B</i>	$\beta$	<i>B</i>	<i>SE B</i>	$\beta$
Age	0.01	0.04	0.01	0.02	0.04	0.01
Gender (M)	-0.49	0.07	-0.17***	-0.44	0.07	-0.15***
Race (white)						
Black	0.02	0.10	0.01	0.00	0.11	0.00
Other	0.24	0.11	0.05**	0.24	0.11	0.05**
HH Poverty Ratio	0.00	0.00	0.03	0.00	0.00	0.03
Resp Education (HS or Less)						
College Degree	0.37	0.08	0.13***	0.38	0.08	0.13***
Graduate Degree	0.68	0.11	0.17***	0.67	0.11	0.16***
Cognitive ability	0.03	0.01	0.07**	0.04	0.01	0.07***
Subjective Health (Excellent)						
Very Good	-0.15	0.07	-0.05**	-0.14	0.07	-0.05*

Variable	Model 1			Model 2		
	<i>B</i>	<i>SE B</i>	$\beta$	<i>B</i>	<i>SE B</i>	$\beta$
Good	-0.16	0.09	-0.04*	-0.16	0.09	-0.05
Fair or Poor	-0.10	0.17	-0.01	-0.12	0.17	-0.02
Res Parent Max Edu	0.00	0.01	0.00	0.00	0.01	0.00
Mother - Age Resp Birth	0.03	0.01	0.09**	0.02	0.01	0.08*
Mother - Age First Birth	-0.01	0.01	-0.03	-0.01	0.01	-0.02
Extraverted	0.05	0.03	0.04	0.04	0.03	0.04
Critical	-0.01	0.02	-0.01	-0.01	0.02	-0.01
Dependable	0.06	0.04	0.04	0.05	0.04	0.03
Anxious	0.02	0.02	0.03	0.02	0.02	0.02
Open	-0.06	0.03	-0.04*	-0.06	0.03	-0.04*
Reserved	-0.02	0.02	-0.02	-0.01	0.02	-0.01
Sympathetic	-0.02	0.03	-0.02	-0.03	0.03	-0.02
Disorganized	0.01	0.02	0.01	0.01	0.02	0.01
Calm	0.02	0.03	0.02	0.03	0.03	0.02

Variable	Model 1			Model 2		
	<i>B</i>	<i>SE B</i>	$\beta$	<i>B</i>	<i>SE B</i>	$\beta$
Uncreative	0.01	0.02	0.01	0.01	0.02	0.01
Hours Worked Weekly	0.01	0.00	0.11	0.01	0.00	0.19
Parental Style	-0.02	0.03	-0.01	-0.01	0.03	-0.01
Number of Children	0.06	0.03	0.05*	0.06	0.03	0.05*
1,000 + Hours worked	0.98	0.12	0.22***	0.81	0.13	0.19***
Reading				-0.02	0.00	-0.11***
Extra Lessons				0.01	0.01	0.03
Watching TV				0.01	0.01	0.03
R <sup>2</sup>			0.20			0.21

\**p* < .1. \*\**p* < .05. \*\*\**p*<.01

Variable	Model 1			Model 2		
	<i>B</i>	<i>SE B</i>	$\beta$	<i>B</i>	<i>SE B</i>	$\beta$
Age	0.01	0.04	0.01	0.01	0.04	0.01
Gender (M)	-0.51	0.07	-0.18 ***	-0.50	0.07	-0.18 ***
Race (white)						
Black	0.03	0.10	0.01	0.00	0.11	0.00
Other	0.26	0.11	0.05 **	0.26	0.11	0.05 **

HH Poverty Ratio	0.00	0.00	0.01		0.00	0.00	0.01	
Resp Education (HS or Less)								
College Degree	0.38	0.08	0.13	***	0.39	0.08	0.13	***
Graduate Degree	0.70	0.11	0.17	***	0.70	0.11	0.17	***
Intelligence	0.00	0.00	0.08	***	0.00	0.00	0.08	***
Subjective Health (Excellent)								
Very Good	-0.13	0.07	-0.05	*	-0.13	0.07	-0.04	*
Good	-0.14	0.09	-0.04		-0.14	0.09	-0.04	
Fair or Poor	-0.04	0.17	-0.01		-0.04	0.17	-0.01	
Res Parent Max Edu	0.00	0.01	0.00		0.00	0.01	0.00	
Mother - Age Resp Birth	0.02	0.01	0.08	**	0.02	0.01	0.08	**
Mother - Age First Birth	-0.01	0.01	-0.03		-0.01	0.01	-0.03	
Extraverted	0.05	0.03	0.04		0.05	0.03	0.04	*
Critical	-0.01	0.02	-0.01		-0.01	0.02	-0.01	
Dependable	0.06	0.04	0.04	*	0.06	0.04	0.04	
Anxious	0.02	0.02	0.03		0.02	0.02	0.02	
Open	-0.06	0.03	-0.05	**	-0.06	0.03	-0.05	**
Reserved	-0.02	0.02	-0.02		-0.02	0.02	-0.02	
Sympathetic	-0.02	0.03	-0.02		-0.03	0.03	-0.02	
Disorganized	0.01	0.02	0.01		0.01	0.02	0.01	
Calm	0.02	0.03	0.02		0.02	0.03	0.02	
Uncreative	0.01	0.02	0.01		0.01	0.02	0.01	
1,000 + Hours worked	1.27	0.10	0.29	***	1.27	0.10	0.29	***
Reading					0.00	0.00	-0.02	
Extra Lessons					0.00	0.00	0.02	
Watching TV					0.00	0.00	0.03	

R2

0.19

0.19

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\* $p < .1$ . \*\* $p < .05$ . \*\*\* $p < .01$

Variable	Model 1				Model 2			
	<i>B</i>	<i>SE B</i>	$\beta$		<i>B</i>	<i>SE B</i>	$\beta$	
Age	0.01	0.04	0.01		0.01	0.04	0.01	
Gender (M)	-0.51	0.07	-0.18	***	-0.50	0.07	-0.18	***
Race (white)								
Black	0.03	0.10	0.01		0.00	0.11	0.00	
Other	0.26	0.11	0.05	**	0.26	0.11	0.05	**
HH Poverty Ratio	0.00	0.00	0.01		0.00	0.00	0.01	
Resp Education (HS or Less)								
College Degree	0.38	0.08	0.13	***	0.39	0.08	0.13	***
Graduate Degree	0.70	0.11	0.17	***	0.70	0.11	0.17	***
Intelligence	0.00	0.00	0.08	***	0.00	0.00	0.08	***
Subjective Health (Excellent)								
Very Good	-0.13	0.07	-0.05	*	-0.13	0.07	-0.04	*
Good	-0.14	0.09	-0.04		-0.14	0.09	-0.04	
Fair or Poor	-0.04	0.17	-0.01		-0.04	0.17	-0.01	
Res Parent Max Edu	0.00	0.01	0.00		0.00	0.01	0.00	
Mother - Age Resp Birth	0.02	0.01	0.08	**	0.02	0.01	0.08	**
Mother - Age First Birth	-0.01	0.01	-0.03		-0.01	0.01	-0.03	
Extraverted	0.05	0.03	0.04		0.05	0.03	0.04	*
Critical	-0.01	0.02	-0.01		-0.01	0.02	-0.01	
Dependable	0.06	0.04	0.04	*	0.06	0.04	0.04	
Anxious	0.02	0.02	0.03		0.02	0.02	0.02	
Open	-0.06	0.03	-0.05	**	-0.06	0.03	-0.05	**
Reserved	-0.02	0.02	-0.02		-0.02	0.02	-0.02	
Sympathetic	-0.02	0.03	-0.02		-0.03	0.03	-0.02	
Disorganized	0.01	0.02	0.01		0.01	0.02	0.01	
Calm	0.02	0.03	0.02		0.02	0.03	0.02	
Uncreative	0.01	0.02	0.01		0.01	0.02	0.01	
1,000 + Hours worked	1.27	0.10	0.29	***	1.27	0.10	0.29	***
Reading					0.00	0.00	-0.02	
Extra Lessons					0.00	0.00	0.02	
Watching TV					0.00	0.00	0.03	
R2			0.19				0.19	

\* $p < .1$ . \*\* $p < .05$ . \*\*\* $p < .01$

Hypothesis 1 stated that time spent reading for pleasure as an adolescent would have a positive effect on life outcomes. There was a statistically significant negative ( $\beta = -0.02, p < .01$ ) impact on wages for respondents that read more. Hypothesis 2 stated that time spent on extra lessons as an adolescent would have a positive effect on life outcomes. Hypothesis 3 stated that time spent watching television as an adolescent would have a negative effect on life outcomes.

Gender predicted wages with women earning less than men ( $\beta = -0.44, p < .01$ ). Educational attainment was predictive of increased wages. Additional variables that were significant included cognitive ability ( $\beta = 0.07, p < .01$ ) in the full model. Respondents reporting being in very good health as compared to being in excellent health were predictive on decreased wages ( $\beta = -0.14, p < .05$ ) in the full model. The age of the respondent's mother when she gave birth to the respondent was predictive of increased wages ( $\beta = 0.02, p < .10$ ). Unsurprisingly, hours worked were also predictive of increased wages ( $\beta = 0.01, p < .01$ ).

### **Employment Status**

A hierarchical multiple regression was run to determine if the addition of the informal human capital investments improved the prediction of employment status over and above the control variables alone. Employment status was measured as a continuous variable in terms of hours worked; two separate analyses each with two stages are used. The first analysis includes all respondents, and the second analysis excludes respondents with zero hours worked. The results of the first analysis are shown in Table 8, and the results of the second analysis are shown in Table 9. In the first analysis, the variance explained by the base model was 5.7%, and the variance explained by the full model dramatically increased to 22%.

Table 8

Summary of Hierarchical Regression Analysis for Variables Predicting Hours Worked (n = 2442)

Variable	Model 1			Model 2		
	<i>B</i>	<i>SE B</i>	$\beta$	<i>B</i>	<i>SE B</i>	$\beta$
Age	-0.29	0.62	-0.01	-0.24	0.56	-0.01
Gender (M)	-4.63	1.11	-0.09***	-6.66	1.02	-0.13***
Race (white)						
Black	3.45	1.63	0.05**	1.79	1.50	0.02
Other	0.00	1.78	0.00	-1.45	1.63	-0.02
HH Poverty Ratio	0.00	0.00	-0.05*	0.00	0.00	-0.03
Resp Education (HS or Less)						
College Degree	4.12	1.22	0.08***	3.63	1.11	0.07***
Graduate Degree	9.21	1.81	0.12***	9.70	1.65	0.12***
Cognitive ability	1.35	0.22	0.15***	0.88	0.20	0.10***
Subjective Health (Excellent)						
Very Good	1.38	1.16	0.03	0.94	1.06	0.02

Variable	Model 1			Model 2		
	<i>B</i>	<i>SE B</i>	$\beta$	<i>B</i>	<i>SE B</i>	$\beta$
Good	2.26	1.38	0.04*	1.51	1.26	0.02
Fair or Poor	6.54	2.68	0.05**	5.96	2.44	0.05**
Res Parent Max Edu	-0.13	0.19	-0.02	-0.08	0.17	-0.01
Mother - Age Resp Birth	0.02	0.14	0.00	0.15	0.13	0.03
Mother - Age First Birth	-0.04	0.16	-0.01	-0.10	0.14	-0.02
Extraverted	0.73	0.45	0.04*	0.82	0.41	0.04**
Critical	-0.16	0.34	-0.01	-0.22	0.31	-0.01
Dependable	1.39	0.56	0.06***	1.49	0.51	0.06**
Anxious	-0.36	0.34	-0.03	-0.10	0.31	-0.01
Open	-0.53	0.46	-0.02	-0.27	0.42	-0.01
Reserved	0.03	0.29	0.00	-0.23	0.27	-0.02
Sympathetic	-0.34	0.43	-0.02	-0.20	0.40	-0.01
Disorganized	-0.06	0.33	0.00	-0.20	0.30	-0.01
Calm	-0.13	0.46	-0.01	-0.07	0.41	0.00

Variable	Model 1			Model 2		
	<i>B</i>	<i>SE B</i>	$\beta$	<i>B</i>	<i>SE B</i>	$\beta$
Uncreative	0.17	0.34	0.01	0.41	0.31	0.03
Parental Style	-0.51	0.55	-0.02	-0.65	0.50	-0.02
Number of Children	-0.28	0.48	-0.01	-0.10	0.44	0.00
Reading				1.29	0.06	0.41***
Extra Lessons				0.14	0.13	0.02
Watching TV				0.07	0.03	0.04*
R <sup>2</sup>			0.06			0.22

\* $p < .1$ . \*\* $p < .05$ . \*\*\* $p < .01$

Hypothesis 1 stated that time spent reading for pleasure as an adolescent would have a positive effect on life outcomes. The results show that each additional hour spent reading was associated with an increase of 1.29 hours worked per week. This increase was significant at the  $p < .01$  level.

Hypothesis 2 stated that time spent on extra lessons as an adolescent would have a positive effect on life outcomes. The results, while not significant, did show a positive effect on employment status. Hypothesis 3 stated that time spent watching television as an adolescent would have a negative effect on life outcomes. The results, showed that each additional hour spent watching television was associated with a statistically significant ( $p < 0.1$ ) increase of just over half an hour per week.

Several control variables were also significant. Employment status was predicted by gender, with women working fewer hours than men ( $\beta = -0.13$ ,  $p < .01$ ) in the full model. Education levels were also predictive of increased work hours. As compared to having a high school diploma or less, having a college degree predicted an increase in hours worked ( $\beta = 0.07$ ,  $p < .01$ ). As compared to having a high school diploma or less, having a graduate degree also predicted an increase in hours worked ( $\beta = 0.12$ ,  $p < .01$ ).

Additional variables that were significant included cognitive ability. As a predictor, cognitive ability was measured on a scale from 0-10. Increased cognitive ability was predictive of more hours worked ( $\beta = 0.10$ ,  $p < .01$ ). Being in fair/poor health as compared to being in excellent health was predictive of working more hours ( $\beta = 0.05$ ,  $p < .05$ ). Being dependable was also significant, with dependability predicting more hours worked ( $\beta = 0.06$ ,  $p < .05$ ).

To further examine the factors, a second analysis was performed with respondents that worked zero hours excluded. The results, shown in Table 9, were very similar with only a few

minor differences. Both analyses used identical controls. In the second model, the variance explained by the base model was 5%, and the variance explained by the full model dramatically increased to 21%.

Table 9

Summary of Hierarchical Regression Analysis for Variables Predicting Hours Worked Excluding Non-workers (n = 2227)

Variable	Model 1			Model 2		
	<i>B</i>	<i>SE B</i>	$\beta$	<i>B</i>	<i>SE B</i>	$\beta$
Age	0.55	0.61	0.02	0.47	0.56	0.02
Gender (M)	-6.33	1.09	-0.13***	-8.25	1.01	-0.17***
Race (white)						
Black	2.14	1.61	0.03	0.85	1.49	0.01
Other	0.66	1.78	0.01	-0.77	1.63	-0.01
HH Poverty Ratio	0.00	0.00	-0.05**	0.00	0.00	-0.03
Resp Education (HS or Less)						
College Degree	3.31	1.20	0.07***	2.87	1.10	0.06**
Graduate Degree	8.32	1.76	0.12***	8.88	1.61	0.12***
Cognitive ability	0.88	0.22	0.10***	0.49	0.20	0.06**
Subjective Health (Excellent)						
Very Good	1.68	1.15	0.03	1.22	1.05	0.02
Good	1.39	1.37	0.02	0.83	1.25	0.01
Fair or Poor	5.25	2.64	0.04**	4.91	2.41	0.04**
Res Parent Max Edu	-0.11	0.18	-0.01	-0.07	0.17	-0.01

Variable	Model 1			Model 2		
	<i>B</i>	<i>SE B</i>	$\beta$	<i>B</i>	<i>SE B</i>	$\beta$
Mother - Age Resp						
Birth	0.03	0.14	0.01	0.17	0.13	0.04
Mother - Age First Birth	-0.06	0.16	-0.01	-0.12	0.14	-0.03
Extraverted	0.56	0.45	0.03	0.64	0.41	0.04
Critical	-0.34	0.34	-0.02	-0.38	0.31	-0.03
Dependable	1.29	0.57	0.05**	1.45	0.52	0.06**
Anxious	-0.26	0.34	-0.02	-0.02	0.31	0.00
Open	-1.02	0.46	-0.05**	-0.69	0.42	-0.03
Reserved	-0.19	0.29	-0.02	-0.42	0.27	-0.03
Sympathetic	-0.26	0.43	-0.01	-0.13	0.39	-0.01
Disorganized	-0.38	0.32	-0.03	-0.48	0.30	-0.03
Calm	-0.10	0.45	-0.01	-0.04	0.41	0.00
Uncreative	-0.05	0.34	0.00	0.22	0.31	0.01
Parental Style	-0.54	0.54	-0.02	-0.69	0.50	-0.03
Number of Children	-0.34	0.48	-0.02	-0.18	0.44	-0.01
Reading				1.16	0.06	0.41***
Extra Lessons				0.15	0.13	0.02
Watching TV				0.04	0.03	0.03
R <sup>2</sup>			0.05			0.21

\* $p < .1$ . \*\* $p < .05$ .

\*\*\* $p < .01$

Hypothesis 1 stated that time spent reading for pleasure as an adolescent would have a positive effect on life outcomes. The results show that each additional hour spent reading was associated with an increase of 1.16 hours worked per week. This increase was significant at the  $p < .01$  level with a  $\beta = 0.41$ . Hypothesis 2 stated that time spent on extra lessons as an adolescent would have a positive effect on life outcomes. The results, while not significant, did show a positive effect on employment status. Hypothesis 3 stated that time spent watching television as an adolescent would have a negative effect on life outcomes. The results, while not significant, did show a positive effect on employment status.

Several control variables were also significant. Employment status was predicted by gender, with women working fewer hours than men ( $\beta = -0.17, p < .01$ ) in the full model. Having a college degree, as compared to having a high school diploma or less, was also predictive of increased work hours ( $\beta = 0.06, p < .01$ ) in the full model. Having a graduate degree, as compared to having a high school diploma or less, was predictive of more hours worked ( $\beta = 0.12, p < .01$ ) in the full model.

Increased cognitive ability, measured on a scale from 0-10, was also predictive of more hours worked ( $\beta = 0.06, p < .05$ ). Being in fair/poor health as compared to being in excellent health was predictive of working more hours ( $\beta = 0.04, p < .05$ ). Being dependable was also predictive of more hours worked ( $\beta = 0.06, p < .01$ ).

### **Cognitive ability**

Cognitive ability was measured as a continuous variable scaled to range from 0-100. This was done to better illustrate the differences in the variables of interest and does not change the coefficient. Cognitive ability was proxied through the use of the ASVAB percentile scores as described in Chapter 3. Because cognitive ability was measured in adolescence, the control

variables, other than personality traits, come from measurements made in adolescence.

Personality traits were measured in Round 12 (2008 Survey). The results are shown in Table 10.

The variance explained by the base model was 30.6%, and the variance explained by the full model was 32%.

Table 10

Summary of Hierarchical Regression Analysis for Variables Predicting Cognitive ability (n = 2447)

Variable	Model 1			Model 2		
	<i>B</i>	<i>SE B</i>	$\beta$	<i>B</i>	<i>SE B</i>	$\beta$
Age	0.40	0.59	0.01	0.43	0.59	0.01
Gender (M)	5.73	1.05	0.10***	4.61	1.06	0.08***
Race (white)						
Black	-18.92	1.52	-0.22***	-18.60	1.53	-0.22***
Other	-4.76	1.72	-0.05***	-4.96	1.71	-0.05***
HH Poverty Ratio	0.01	0.00	0.11***	0.01	0.00	0.11***
Subjective Health (Excellent)						
Very Good	2.20	1.12	0.04**	2.26	1.11	0.04**
Good	-5.14	1.33	-0.07***	-4.94	1.32	-0.07***
Fair or Poor	-7.98	2.59	-0.05***	-7.34	2.57	-0.05***
Res Parent Max Edu	1.91	0.18	0.21***	1.86	0.18	0.20***
Mother - Age Resp Birth	-0.17	0.14	-0.03	-0.12	0.14	-0.02

Variable	Model 1			Model 2		
	<i>B</i>	<i>SE B</i>	$\beta$	<i>B</i>	<i>SE B</i>	$\beta$
Mother - Age First Birth	1.03	0.15	0.17***	0.98	0.15	0.17***
Extraverted	-1.84	0.43	-0.09***	-1.86	0.43	-0.09***
Critical	0.25	0.33	0.01	0.23	0.32	0.01
Dependable	1.30	0.54	0.05**	1.30	0.53	0.05**
Anxious	-3.27	0.33	-0.20***	-3.10	0.32	-0.19***
Open	0.10	0.45	0.00	0.20	0.44	0.01
Reserved	0.23	0.28	0.02	0.17	0.28	0.01
Sympathetic	-0.71	0.42	-0.03*	-0.63	0.42	-0.03
Disorganized	1.57	0.31	0.09***	1.53	0.31	0.09***
Calm	-0.18	0.44	-0.01	-0.12	0.44	-0.01
Uncreative	-0.99	0.33	-0.05***	-0.89	0.32	-0.05
Parental Style	1.30	0.53	0.04**	1.17	0.52	0.04
Number of Children	0.05	0.46	0.00***	0.03	0.46	0.00
Reading				0.32	0.06	0.09***

Variable	Model 1			Model 2		
	<i>B</i>	<i>SE B</i>	$\beta$	<i>B</i>	<i>SE B</i>	$\beta$
Extra Lessons				0.52	0.14	0.06***
Watching TV				-0.07	0.04	-0.03*
R <sup>2</sup>			0.31			0.32

\* $p < .1$ . \*\* $p < .05$ . \*\*\* $p < .01$

Hypothesis 1 stated that time spent reading for pleasure as an adolescent would have a positive effect on life outcomes. The results show that each additional hour spent reading was associated with an increase in cognitive ability of .32 points. This increase was significant at the  $p < .01$  level.

Hypothesis 2 stated that time spent on extra lessons as an adolescent would have a positive effect on life outcomes. The results show that each additional hour spent on extra lessons was associated with an increase in cognitive ability of .52 points. This increase was significant at the  $p < .01$  level.

Hypothesis 3 stated that time spent watching television as an adolescent would have a negative effect on life outcomes. The results show that each additional hour spent watching television was associated with a decrease in cognitive ability of .07 points. This decrease was significant at the  $p < .01$  level.

In both models, several control variables were also significant. Cognitive ability was predicted by gender ( $\beta = .08, p < .01$ ). Being Black as compared to White was associated with a drop of 18.60 points on cognitive ability scores ( $\beta = -0.21, p < .01$ ). Household poverty level ( $\beta = 0.11, p < .01$ ) was predictive of higher cognitive ability scores meaning respondents in households with more income were predicted to have higher levels of cognitive ability. Respondents reporting being in good health as compared to excellent health ( $\beta = -0.07, p < .01$ ) in the full model had lower cognitive ability scores. Respondents reporting being in fair/poor health as compared to being in excellent health ( $\beta = -0.05, p < .01$ ) were also predictive of lower cognitive ability scores. The older the respondent's mother when she gave birth to her first child ( $\beta = 0.17, p < .01$ ) predicted greater levels of cognitive ability for the respondent. Many of the personality measures were also significant predictors of lower cognitive ability scores.

Extraversion ( $\beta = -0.09$ ,  $p < .01$ ), being anxious ( $\beta = -0.19$ ,  $p < .01$ ), being disorganized ( $\beta = -0.09$ ,  $p < .01$ ), and being uncreative ( $\beta = -0.05$ ,  $p < .01$ ) were all predictive of lower respondent cognitive ability scores. Being dependable was predictive of higher cognitive ability scores ( $\beta = 0.05$ ,  $p < .05$ ).

### **Summary**

A total of six analyses were performed, each with a base and full model. The results are compared to the research hypotheses in Table 11 below. Most results fit with the theoretical framework.

Table 5

## Summary of Results

Life Outcome	Educational Attainment – High School Diploma	Educational Attainment – College Degree	Wages	Wages exclude less than 1k hours	Employment Status	Employment Status - exclude zero hours	Cognitive ability
Hypothesis 1 - Reading is positive	Yes, $p < .10$	Yes, not significant	No, $p < .01$	No, $p < .01$	Yes, $p < .01$	Yes, $p < .01$	Yes, $p < .01$
Hypothesis 2 - Lessons are positive	Yes, not significant	Yes, not significant	Yes, not significant	Yes, not significant	Yes, $p < .01$	Yes, not significant	Yes, $p < .01$
Hypothesis 3 - Television is negative	Yes, not significant	Yes, not significant	No, not significant	No, not significant	No, $p < .05$	No, not significant	Yes, $p < .10$
Base model explanatory power	28%	38%	17%	20%	6%	5%	31%
Full model explanatory power	29%	38%	19%	21%	22%	21%	32%

## **Chapter 5 - Discussion**

This chapter addresses the purpose of the study and provides an overview and justification of what was done. The chapter then discusses the methodology and findings of the research, results, implications, and limitations. The chapter concludes with recommendations for future research.

### **Purpose and Overview**

According to human capital theory, investments in human capital will increase marginal productivity (Becker, 1962; J. Mincer, 1958; Schultz, 1961). A common investment examined in human capital theory research is educational attainment (Altonji et al., 2014; Carnevale & Cheah, 2013). Because employers reward increased marginal productivity with increased wages, the return on investments in education is often measured in wages (Altonji et al., 2012; Card, 1999; Hout, 2012; Psacharopoulos & Patrinos, 2004; Rumberger & Thomas, 1993).

The returns on investments in human capital were further explored in this dissertation. Using human capital theory as a framework, the purpose of this dissertation was to evaluate the effects informal human capital investments made in adolescence on four life outcomes. Informal human capital investments were defined as investments made outside the formal education system. The specific informal human capital investments used to predict life outcomes were the time adolescents spent (a) reading for pleasure, (b) taking extra lessons, and (c) watching television. The four life outcomes examined were (a) educational attainment, (b) wages, (c) employment

status, and (d) cognitive ability. Additional variables that the theoretical framework and the literature review suggested might also effect life outcomes examined were used in the analyses as well. This dissertation adds to the literature in two ways: (a) exploring the effects of informal human capital investments rather than formal human capital investments and (b) exploring additional life outcomes.

Based on the theoretical framework, informal human capital investments were hypothesized to have an effect on life outcomes. Reading and taking extra lessons were hypothesized to have a positive effect on life outcomes. Watching television was hypothesized to have a negative effect on life outcomes. The results generally supported the research hypotheses.

### **Methodology and Findings**

Longitudinal data from the National Longitudinal Study of Youth 1997, which tracks individuals from adolescence to early adulthood, were used for this study. Hierarchical regression was used to examine the effect of the informal human capital investments on all four life outcomes. All findings with statistical significance of the variables of interest, except two, were anticipated by the theoretical framework.

As outlined in Table 10 above, the results showed that educational attainment was significantly and positively associated with time spent reading for pleasure as an adolescent and taking extra lessons. Educational attainment was significantly and negatively associated with watching television during adolescence. Adult wages were significantly and negatively associated with additional time spent reading in adolescence by a fraction of a cent, although the significance of this association disappeared when the sample was

restricted to exclude those that worked less than 1,000 hours per year. Employment status was significantly and positively associated with reading and watching television. When removing respondents with zero hours worked, only reading was statistically significant. Cognitive ability was significantly and positively associated with time spent reading for pleasure as an adolescent and taking extra lessons. Cognitive ability was significantly and negatively associated with watching television. The findings for each dependent variable are elaborated upon below followed by additional discussion on the variables of interest.

## **Dependent Variables**

### **Educational Attainment**

Educational attainment was measured based on whether the respondent earned a bachelor's degree or not. In the first analysis while the second analysis focused on educational attainment closer to the time period where the adolescents made the informal human capital investment by predicting the likelihood of earning a high school diploma. Educational attainment is often used as the formal investment made in human capital research (Altonji et al., 2012). As an investment, higher education has been a predictor for many positive life outcomes (Baum et al., 2010). Educational attainment was used as both a predictor and an outcome in different analyses. As a predictor, the results were in line with human capital theory and previous literature. As an outcome, educational attainment was predicted by reading and watching television, with reading associated with earning a college degree, and watching television associated with not earning a college degree.

Reading and television were both significant predictors of educational attainment with reading associated with greater likelihood of earning a college degree and watching television associated with a lower likelihood of earning a college degree. The

model explained 38% (Nagelkerke  $R^2$ ) of the variance in earning a bachelor's degree and correctly classified 74.5% of cases. Not having a college degree was accurately predicted for 80.3% of the cases and having a college degree was accurately predicted for 66.7% of the cases.

An additional analysis predicting likelihood of earning a high school diploma was also conducted. This analysis correctly predicted 74.7% of the respondent's educational attainment with an accuracy of 80.4% when predicting whether a respondent failed to earn a high school diploma and an accuracy of 67.1% when predicting whether the respondent would graduate from high school.

### **Wages**

Wages were measured through the natural log of wages plus a penny. Investments in human capital increase marginal productivity, and employers reward productivity with increased wages (Becker, 1962). Only reading was found to be a significant predictor of wages, and, surprisingly, more time spent reading was associated with lower wages. This significance disappeared when the analysis was restricted to include only respondents that worked 1,000 hours or more. This finding could be due to some respondents choosing not to work.

Only reading was a significant predictor of wages and, surprisingly, reading was associated with a reduction in wages. However this significance was not present in the model that excluded respondents that worked less than 1,000 hours. In the first analysis, the variance explained was 18.9%. In the second analysis, the variance explained was 19.3%.

### **Employment Status**

Employment status was measured through hours worked in 2014. Employers reward marginal productivity with increased wages, continued employment, and offers of employment (Becker, 1994; J. Mincer, 1958). According to human capital theory, investments in human capital will increase marginal productivity (Becker, 1962). As expected, informal investments in human capital were associated with increased employment.

Reading and taking extra lessons were both statistically significant predictors of employment status before restricting the model to exclude participants with zero hours worked. Once the non-workers were excluded, only reading was statistically significant. The first analysis explained 22% of the variance and the restricted model explained 21.2% of the variance.

### **Cognitive ability**

Cognitive ability was measured through ASVAB percentile scores. Cognitive and vocabulary development increases in children who are read to by their parents (Duursma et al., 2008; Raikes et al., 2006). This dissertation takes this same idea to adolescents that read for pleasure and found similar outcomes with increased cognitive ability scores. Extra lessons have also been linked with increased cognitive ability with the use of private tutors (Bray, 2006; Cheek & Smith, 1998; Ho et al., 2003). A similar result was found with respondents taking extra lessons scoring higher ASVAB percentile scores. Television watching was found to have a negative impact on cognitive ability.

Reading and taking extra lessons were both statistically significant predictors of increased cognitive ability. Watching television was also statistically significant, but as hypothesized, the effect on cognitive ability was negative. The variance explained by the model was 32%

## **Variables of Interest**

### **Reading**

Based on the theoretical framework, it was hypothesized that reading for pleasure would have a positive impact on life outcomes. The results of the analyses on the impact of time spent reading showed significant positive correlation with three of the four life outcomes. Educational attainment, employment status, and cognitive ability were all significantly and positively correlated with time spent reading as an adolescent. Time spent reading was also significantly and negatively correlated with wages, but the reduction was extremely low. In addition, this negative significance was not present when the analysis was restricted to exclude respondents with less than 1,000 hours worked.

### **Extra Lessons**

Based on the theoretical framework, it was hypothesized that taking extra lessons would have a positive impact on life outcomes. The results of the analyses on time spent taking extra lessons were significantly and positively associated with educational attainment, employment status, and cognitive ability. Wages were not significantly impacted by taking extra lessons. Extra lessons may have come with a financial cost as well.

### **Watching Television**

Based on the theoretical framework, it was hypothesized that watching television would have a negative impact on life outcomes. Watching television was significantly and negatively associated with educational attainment and cognitive ability. Note that

the literature review did find some positive outcomes for watching educational programming connected with schoolwork. While not statistically significant, one rather interesting findings was that watching television was associated with slightly higher wages.

### **Implications of the Findings**

The biggest takeaway from this dissertation might be the positive path parents can guide their kids towards by encouraging children to read, possibly even requiring reading time to earn screen time. This study helps parents can better understand the potential benefits of obtaining a library card and encouraging their children to read, the return on the cost of paying for extra lessons, and possibly regulating time in front of the television screen. A mother trying to convince her children to go to bed without watching one more show can cite this study to encourage the children to enjoy a story read to them or one they read on their own. Parents have a strong influence over the formation of preferences of children (Heckman, 2008). Thus, these formative years are an excellent time to positively shape adolescent's future habits by possibly encouraging children to take advantage of their local library.

The findings suggested reading provided many benefits, some of which are linked to multiple outcomes. This makes an argument for policy changes increasing funding for libraries or raising awareness of accessibility to populations that do not have a library card. Membership drives could strategically target specific neighborhoods to increase awareness.

The descriptive statistics showed that there were fewer minutes spent on extra lessons than reading or watching television. One reason for this might be the financial cost of extra lessons. However, the extra lessons data were from 1997 and with the ubiquity of the internet, extra lessons are now widely available at extremely low costs. Many universities offer advanced and introductory level

courses for free. Other websites offer courses in high school level subjects. Smart phone users can access foreign language training for free through DuoLingo. Piano and other instrument lessons can be accessed on YouTube. Extremely high quality extra lessons are now available to any adolescent with access to a computer and the internet. Most public libraries offer both computers and access to the internet for no financial cost, just the time investment the adolescent would need to make. The results suggest again that policy designed to increase the use of public libraries could have a positive impact on several life outcomes for adolescents. Parents, as discussed above, could encourage their children to take extra lessons, something that might be especially useful for adolescents to gain exposure to college-level courses. The results also suggest that parents might set viewing limits or encourage children to spend less time watching television.

### **Limitations**

The longitudinal nature of the NLSY97 allows researchers to track the adolescents from adolescence to early adulthood; however, the methods used to measure the variables are not always ideal for any given research question. For the purposes of this dissertation, the variables of interest, time spent reading for pleasure, taking extra lessons, and watching television are only asked of respondents in Round 1. The respondents could have changed the informal investments over the years leading to adulthood, which could influence results. Ideally, the variables of interest would be examined longitudinally, up to the point of the outcome variables.

Additionally, the variables of interest lack specificity. What was read, the types of lessons, and the programming viewed are unknown. The items read for pleasure could be at a lower reading level, fiction, non-fiction, or even comic books. The extra lessons

could be in any area, which makes it impossible to distinguish between soccer lessons, music lessons, or math tutoring as informal human capital investment in the analysis. In addition, the choice of extra lessons might not be available to all respondents through both cost and parental discretion. The television viewing could be educational shows that complement the respondent's education or television that provides a skewed view of wealth and violence in the real world, but no information about the programs watched was provided.

Cognitive ability was proxied by ASVAB percentile scores, however taking the ASVAB was a choice made by the respondents. This means that data for cognitive ability were MNAR and this could alter the results as the respondents choosing to take the ASVAB may be systematically different than respondents that chose to not take the ASVAB. The analyses only used complete cases, so respondents that chose not to take the ASVAB were not included in the analysis. The use of the ASVAB was the best available measure of cognitive ability for the analyses because other alternatives such as optional college entrance exams, had fewer respondents than the ASVAB.

The coefficients were small on most of the predictor variables, even those variables of interest. This makes interpretation, even with statistical significance, difficult to apply. In addition, some of the common predictor variables in the models had significant impact on the outcomes examined. Education and cognitive ability were significant and positive predictors of almost every outcome. Thus, if reading predicts greater cognitive ability and cognitive ability is later used as a control for educational attainment, the answers become difficult to explain. Cognitive ability and reading in adolescence predict that respondent will be more likely to earn a college degree. But it is difficult to say whether reading predicted both cognitive ability and educational attainment or if cognitive ability was

actually a predictor of reading which predicted educational attainment. This thought process can continue and become more convoluted as the outcomes and predictors switch places. While the analyses show which predictors are statistically significant and great care was taken to ensure the measurements of each predictor was taken prior to the outcome, it is impossible to say that cognitive ability did not exist prior to the respondent reading.

### **Future Direction**

Additional research is necessary to understand the effect of informal human capital investments on life outcomes. There is a large portion of the population that will never attend college and an understanding of informal human capital investments may improve life outcomes. In addition to examining informal human capital investments on a global scale, prison and military populations merit consideration. Military personnel receive special training with an employer that does not have the same financial restrictions or goals as a profit maximizing employer. Prisoners, adult and juvenile, might benefit from additional resources to make human capital investments. Policy could transform the current human capital investments made in these populations should benefits be shown.

The future direction of this type of research is exciting. Technological advances have made the cost of extra lessons extremely minimal. Universities offer free courses available online with the only requirements being a computer, internet connection, and the motivation to learn. Massive Open Online Courses (MOOCs) offer advanced college-level instruction from Ivy League professors on history, finance, robotics and almost anything else a student might want to learn – and this is all available at no charge.

Computers and an internet connection are both available for free at a public library. Studying the outcomes of people who enroll and complete these online classes could be fascinating. Perhaps the types of classes a person chooses to complete will have an impact on outcomes. Employers may someday value an applicant with an extremely focused resume of courses completed online more than one with a general education.

In addition, technological advances have also increased access to books. The Gutenberg project is a freely accessible online repository of classic books. Most public libraries offer patrons the ability to borrow and read books on tablets or laptops. Curated reading lists, synopses of classic books, and discussion forums can be found online for additional support.

Do-it-yourselfers can find free videos online that provide instruction on fixing a leaky faucet, replacing a car door handle, installing dry wall, or any number of skills one might want to learn. The musically inclined might search out a video on playing their favorite song on a guitar or piano. So much is available today that the respondents in this longitudinal dataset did not have access to in 1997. It will be fascinating to see the impact of technology on the human capital investments that people make in themselves.

## **Conclusion**

This dissertation has shown that informal human capital investments made in adolescence have an effect on life outcomes. The statistically significant results were generally in agreement with the research hypotheses. Reading for pleasure and taking extra lessons both had generally positive effects on key life outcomes. Watching television had a generally negative effect on life outcomes. The implications of the findings suggest that parents, educators, and adolescents will benefit from informal human capital investments.

Future research could be especially beneficial for specific populations such as military personnel and prisoners. The current ubiquity of the internet and the MOOC offerings available online have created cheap and accessible human capital investments that provide a new avenue of research into human capital theory. This dissertation adds to the literature but there is much more to understand.

This dissertation controlled for household poverty levels in adolescence. Examining the impact of these informal human capital investments on households below a certain poverty level might prove to be greater than households above that poverty level. Another possibility would be to examine the impact of informal human capital investments during college to see if student's life outcomes were different if they spent time outside the university reading, watching television/movies, and taking extra lessons.

The future of human capital research is fascinating. The technological advances have made the reduced the cost of the investment to a point where the biggest question is motivation. How motivated will people be to make human capital investments and what will the outcome be for the individual and society.

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## Appendix

Table A1

*Summary of Variable Measurement for Regression Analyses*

### **Dependent Variables**

Educational Attainment: College	1 = College degree; 0 = No college degree
Educational Attainment: High School	2 = High school diploma or GED; 0 = No high school diploma or GED
Wages	Natural log of annual wages in 2014 + .01. Continuous.
Hours worked	Summation of hours worked in 2014 and then divided by 52
Cognitive ability	ASVAB percentile score, scaled from 0-100

### **Independent Variables**

Age	Continuous
Gender (M)	1 = Male; 0 = Female
<b><i>Race/Ethnicity</i></b>	
White	1 = White; 0 otherwise
Black	1 = Black; 0 otherwise
Other	1 = Other; 0 otherwise
HH Poverty Ratio	Continuous

### ***Resp Education***

High School Diploma or GED	1 = HS diploma or GED; 0 otherwise
College Degree	1 = Associates or Bachelor's Degree; 0 otherwise
Graduate Degree	1 = Graduate or Professional Degree; 0 otherwise
Cognitive ability	ASVAB percentile score, scaled from 0-10
<b><i>Self-rated health</i></b>	
Excellent	1 if self-reported health is excellent; 0 otherwise
Very good	1 if self-reported health is very good or good; 0 otherwise
Good	1 if self-reported health is good; 0 otherwise
Fair / poor	1 if self-reported health is fair or poor; 0 otherwise
Res Parent Max Edu	Self-reported years of school by residential parents, the lower number is discarded and the highest is used
Mother - Age Resp Birth	Age of biological mother at her first birth. Continuous
Mother - Age First Birth	Age of biological mother when she gave birth to the respondent. Continuous.
Extraverted	Scaled from 1-7 with 7 agreeing strongly.
Critical	Scaled from 1-7 with 7 agreeing strongly.
Dependable	Scaled from 1-7 with 7 agreeing strongly.
Anxious	Scaled from 1-7 with 7 agreeing strongly.
Open	Scaled from 1-7 with 7 agreeing strongly.
Reserved	Scaled from 1-7 with 7 agreeing strongly.
Sympathetic	Scaled from 1-7 with 7 agreeing strongly.
Disorganized	Scaled from 1-7 with 7 agreeing strongly.
Calm	Scaled from 1-7 with 7 agreeing strongly.
Uncreative	Scaled from 1-7 with 7 agreeing strongly.

1,000 + Hours worked

Excluded respondents with less than 1,000 hours worked.

Reading,  
Extra Lessons, and  
Watching TV

Multiple steps are used to determine total time spent on each activity. Respondents are first asked if they spend any time on the activity. 1 = yes, 2 = no. Those answering no are coded as zero minutes. Those answering yes are then asked for the number of weekdays they spend reading for pleasure. The respondents are then asked two separate questions to ascertain the hours and minutes spent during on weekdays. The hours are converted to minutes by multiplying by 60 and the total weekday minutes are created by multiplying that answer by the number of weekdays spent on the activity. The respondents are also asked for time spent on weekends in hours and minutes. This is converted to total weekend minutes by multiplying the hours by 60 and adding the minutes claimed. Total weekend minutes and total weekday minutes are combined for a total minute's number. This is divided by 60 to determine hours spent each week.

*Selected SPSS Coding*

**Importing Additional Variables Post Defense**

```
SORT CASES BY R0000100.  
DATASET ACTIVATE DataSet2.  
SORT CASES BY R0000100.  
DATASET ACTIVATE DataSet1.  
MATCH FILES /FILE=*  
  /FILE='DataSet2'  
  /BY R0000100.  
EXECUTE.
```

**Cleaning Parental Styles**

```
IF (ResMotherParentingStyle_1997 >= 1) CleanResMomPStyle=ResMotherParentingStyle_1997.  
EXECUTE.  
IF (NonResMotherParentingStyle_1997 >= 1) CleanNonResMotherPStyle=NonResMotherParentingStyle_1997.  
EXECUTE.  
IF (ResFatherParentingStyle >= 1) CleanResDadPStyle=ResFatherParentingStyle.  
EXECUTE.  
IF (NonResFatherParentingStyle_1997 >= 1) CleanNoNResDadPStyle=NonResFatherParentingStyle_1997.  
EXECUTE.
```

**Calculating Average Score for Parental Style**

```
COMPUTE ParentingStyleAverage=MEAN(CleanResMomPStyle,CleanNonResMotherPStyle,CleanResDadPStyle,  
  CleanNoNResDadPStyle).  
EXECUTE.
```

**Creating HS or not Binary Variable**

```
IF (Z9083900 >= 0) EducationClean=Z9083900.  
EXECUTE.
```

```
RECODE EducationClean (0=0) (1 thru Highest=1) INTO EduBinaryHSorNot.  
VARIABLE LABELS EduBinaryHSorNot 'EduBinaryHSorNot'.  
EXECUTE.
```

### Regression Analyses

#### Logistic Regression for HS Education or not, Base and Full

LOGISTIC REGRESSION VARIABLES EduBinaryHSorNot

/METHOD=ENTER Age Gender1M RaceCondensed PovRatio ASVABIV10 SubjHealthCondensed

CombinedResParentMaxEdu MomAgeRespBirth MomAgeFirstBirth Extrvrt Critical DpndbleSlfDispl Anxious Open Reserved

Sympathetic DisrgnzCareless Calm Uncreative ParentingStyleAverage ChildreninHHunder18

/CONTRAST (SubjHealthCondensed)=Indicator(1)

/CONTRAST (Gender1M)=Indicator(1)

/CONTRAST (RaceCondensed)=Indicator

/CLASSPLOT

/CASEWISE OUTLIER(2)

/PRINT=GOODFIT CI(95)

/CRITERIA=PIN(0.05) POUT(0.10) ITERATE(20) CUT(0.5).

LOGISTIC REGRESSION VARIABLES EduBinaryHSorNot

/METHOD=ENTER Age Gender1M RaceCondensed PovRatio ASVABIV10 SubjHealthCondensed

CombinedResParentMaxEdu MomAgeRespBirth MomAgeFirstBirth Extrvrt Critical DpndbleSlfDispl Anxious Open Reserved

Sympathetic DisrgnzCareless Calm Uncreative ParentingStyleAverage ChildreninHHunder18 ReadTotalHoursIV

LessonsTotalHoursIV TVTotalHoursIV

/CONTRAST (SubjHealthCondensed)=Indicator(1)

/CONTRAST (Gender1M)=Indicator(1)

/CONTRAST (RaceCondensed)=Indicator

/CLASSPLOT

/CASEWISE OUTLIER(2)

/PRINT=GOODFIT CI(95)

/CRITERIA=PIN(0.05) POUT(0.10) ITERATE(20) CUT(0.5).

**Logistic Regression for College Degree or not, Base and Full**

LOGISTIC REGRESSION VARIABLES EduBinary

/METHOD=ENTER Age Gender1M RaceCondensed PovRatio ASVABIV10 SubjHealthCondensed

CombinedResParentMaxEdu MomAgeRespBirth MomAgeFirstBirth Extrvrt Critical DpndbleSlfDispl Anxious Open Reserved

Sympathetic DisrgnzCareless Calm Uncreative ParentingStyleAverage ChildreninHHunder18

/CONTRAST (SubjHealthCondensed)=Indicator(1)

/CONTRAST (Gender1M)=Indicator(1)

/CONTRAST (RaceCondensed)=Indicator

/CLASSPLOT

/CASEWISE OUTLIER(2)

/PRINT=GOODFIT CI(95)

/CRITERIA=PIN(0.05) POUT(0.10) ITERATE(20) CUT(0.5).

LOGISTIC REGRESSION VARIABLES EduBinary

/METHOD=ENTER Age Gender1M RaceCondensed PovRatio ASVABIV10 SubjHealthCondensed

CombinedResParentMaxEdu MomAgeRespBirth MomAgeFirstBirth Extrvrt Critical DpndbleSlfDispl Anxious Open Reserved

Sympathetic DisrgnzCareless Calm Uncreative ParentingStyleAverage ChildreninHHunder18 ReadTotalHoursIV

LessonsTotalHoursIV TVTotalHoursIV

/CONTRAST (SubjHealthCondensed)=Indicator(1)

/CONTRAST (Gender1M)=Indicator(1)

/CONTRAST (RaceCondensed)=Indicator

/CLASSPLOT

/CASEWISE OUTLIER(2)

/PRINT=GOODFIT CI(95)

/CRITERIA=PIN(0.05) POUT(0.10) ITERATE(20) CUT(0.5).

**OLS Log of Wages, Base and Full for all and excluding respondents with fewer than 1,000 annual hours worked**

REGRESSION

/DESCRIPTIVES MEAN STDDEV CORR SIG N  
/MISSING LISTWISE  
/REGWGT=WEIGHTING  
/STATISTICS COEFF OUTS CI(95) R ANOVA COLLIN TOL CHANGE ZPP

/CRITERIA=PIN(.05) POUT(.10)

/NOORIGIN

/DEPENDENT nLogWages

/METHOD=ENTER Age Gender1M Black Other PovRatio Edu1 Edu2 ASVABIV10 VeryGood Good Fair.Poor

CombinedResParentMaxEdu MomAgeRespBirth MomAgeFirstBirth Extrvrt Critical DpndbleSlfDispl Anxious Open Reserved

Sympathetic DisrgnzCareless Calm Uncreative AverageWorkWeekly ParentingStyleAverage ChildreninHHunder18

/RESIDUALS DURBIN.

REGRESSION

/DESCRIPTIVES MEAN STDDEV CORR SIG N  
/MISSING LISTWISE  
/REGWGT=WEIGHTING  
/STATISTICS COEFF OUTS CI(95) R ANOVA COLLIN TOL CHANGE ZPP

/CRITERIA=PIN(.05) POUT(.10)

/NOORIGIN

/DEPENDENT nLogWages

/METHOD=ENTER Age Gender1M Black Other PovRatio Edu1 Edu2 ASVABIV10 VeryGood Good Fair.Poor

CombinedResParentMaxEdu MomAgeRespBirth MomAgeFirstBirth Extrvrt Critical DpndbleSlfDispl Anxious Open Reserved

Sympathetic DisrgnzCareless Calm Uncreative AverageWorkWeekly ParentingStyleAverage ChildreninHHunder18

ReadTotalHoursIV LessonsTotalHoursIV TVTotalHoursIV

/RESIDUALS DURBIN.

REGRESSION

/DESCRIPTIVES MEAN STDDEV CORR SIG N  
/MISSING LISTWISE  
/REGWGT=WEIGHTING  
/STATISTICS COEFF OUTS CI(95) R ANOVA COLLIN TOL CHANGE ZPP

/CRITERIA=PIN(.05) POUT(.10)

/NOORIGIN

/DEPENDENT nLogWages

/METHOD=ENTER Age Gender1M Black Other PovRatio Edu1 Edu2 ASVABIV10 VeryGood Good Fair.Poor

CombinedResParentMaxEdu MomAgeRespBirth MomAgeFirstBirth Extrvrt Critical DpndbleSlfDispl Anxious Open Reserved

Sympathetic DisrgnzCareless Calm Uncreative AverageWorkWeekly ParentingStyleAverage ChildreninHHunder18  
Onekplusworkhours

/RESIDUALS DURBIN.

REGRESSION

/DESCRIPTIVES MEAN STDDEV CORR SIG N  
/MISSING LISTWISE  
/REGWGT=WEIGHTING  
/STATISTICS COEFF OUTS CI(95) R ANOVA COLLIN TOL CHANGE ZPP

/CRITERIA=PIN(.05) POUT(.10)

/NOORIGIN

/DEPENDENT nLogWages

/METHOD=ENTER Age Gender1M Black Other PovRatio Edu1 Edu2 ASVABIV10 VeryGood Good Fair.Poor

CombinedResParentMaxEdu MomAgeRespBirth MomAgeFirstBirth Extrvrt Critical DpndbleSlfDispl Anxious Open Reserved

Sympathetic DisrgnzCareless Calm Uncreative AverageWorkWeekly ParentingStyleAverage ChildreninHHunder18  
Oneplusworkhours ReadTotalHoursIV LessonsTotalHoursIV TVTotalHoursIV

/RESIDUALS DURBIN.

**OLS Average hours worked per week: Full, base, and with no zero hours**

REGRESSION

/DESCRIPTIVES MEAN STDDEV CORR SIG N

/MISSING LISTWISE

/REGWGT=WEIGHTING

/STATISTICS COEFF OUTS CI(95) R ANOVA COLLIN TOL CHANGE ZPP

/CRITERIA=PIN(.05) POUT(.10)

/NOORIGIN

/DEPENDENT AverageWorkWeekly

/METHOD=ENTER Age Gender1M Black Other PovRatio Edu1 Edu2 ASVABIV10 VeryGood Good Fair.Poor

CombinedResParentMaxEdu MomAgeRespBirth MomAgeFirstBirth Extrvrt Critical DpndbleSlfDispl Anxious Open Reserved

Sympathetic DisrgnzCareless Calm Uncreative ParentingStyleAverage ChildreninHHunder18

/RESIDUALS DURBIN.

REGRESSION

/DESCRIPTIVES MEAN STDDEV CORR SIG N

/MISSING LISTWISE

/REGWGT=WEIGHTING

/STATISTICS COEFF OUTS CI(95) R ANOVA COLLIN TOL CHANGE ZPP

/CRITERIA=PIN(.05) POUT(.10)

/NOORIGIN

/DEPENDENT AverageWorkWeekly

/METHOD=ENTER Age Gender1M Black Other PovRatio Edu1 Edu2 ASVABIV10 VeryGood Good Fair.Poor

CombinedResParentMaxEdu MomAgeRespBirth MomAgeFirstBirth Extrvrt Critical DpndbleSlfDispl Anxious Open Reserved

Sympathetic DisrgnzCareless Calm Uncreative ParentingStyleAverage ChildreninHHunder18 ReadTotalHoursIV  
LessonsTotalHoursIV TVTotalHoursIV  
/RESIDUALS DURBIN.

REGRESSION

/DESCRIPTIVES MEAN STDDEV CORR SIG N

/MISSING LISTWISE

/REGWGT=WEIGHTING

/STATISTICS COEFF OUTS CI(95) R ANOVA COLLIN TOL CHANGE ZPP

/CRITERIA=PIN(.05) POUT(.10)

/NOORIGIN

/DEPENDENT AverageWorkWeeklyNo0s

/METHOD=ENTER Age Gender1M Black Other PovRatio Edu1 Edu2 ASVABIV10 VeryGood Good Fair.Poor

CombinedResParentMaxEdu MomAgeRespBirth MomAgeFirstBirth Extrvrt Critical DpndbleSlfDispl Anxious Open Reserved

Sympathetic DisrgnzCareless Calm Uncreative ParentingStyleAverage ChildreninHHunder18

/RESIDUALS DURBIN.

REGRESSION

/DESCRIPTIVES MEAN STDDEV CORR SIG N

/MISSING LISTWISE

/REGWGT=WEIGHTING

/STATISTICS COEFF OUTS CI(95) R ANOVA COLLIN TOL CHANGE ZPP

/CRITERIA=PIN(.05) POUT(.10)

/NOORIGIN

/DEPENDENT AverageWorkWeeklyNo0s

/METHOD=ENTER Age Gender1M Black Other PovRatio Edu1 Edu2 ASVABIV10 VeryGood Good Fair.Poor

CombinedResParentMaxEdu MomAgeRespBirth MomAgeFirstBirth Extrvrt Critical DpndbleSlfDispl Anxious Open Reserved

Sympathetic DisrgnzCareless Calm Uncreative ParentingStyleAverage ChildreninHHunder18 ReadTotalHoursIV  
LessonsTotalHoursIV TVTotalHoursIV

/RESIDUALS DURBIN.

### **OLS Cognitive Ability**

REGRESSION

/DESCRIPTIVES MEAN STDDEV CORR SIG N

/MISSING LISTWISE

/REGWGT=WEIGHTING

/STATISTICS COEFF OUTS CI(95) R ANOVA COLLIN TOL CHANGE ZPP

/CRITERIA=PIN(.05) POUT(.10)

/NOORIGIN

/DEPENDENT ASVABDV100

/METHOD=ENTER Age Gender1M Black Other PovRatio VeryGood Good Fair.Poor

CombinedResParentMaxEdu MomAgeRespBirth MomAgeFirstBirth Extrvrt Critical DpndbleSlfDispl Anxious Open Reserved

Sympathetic DisrgnzCareless Calm Uncreative ParentingStyleAverage ChildreninHHunder18

/RESIDUALS DURBIN.

REGRESSION

/DESCRIPTIVES MEAN STDDEV CORR SIG N

/MISSING LISTWISE

/REGWGT=WEIGHTING

/STATISTICS COEFF OUTS CI(95) R ANOVA COLLIN TOL CHANGE ZPP

/CRITERIA=PIN(.05) POUT(.10)

/NOORIGIN

/DEPENDENT ASVABDV100

/METHOD=ENTER Age Gender1M Black Other PovRatio VeryGood Good Fair.Poor

CombinedResParentMaxEdu MomAgeRespBirth MomAgeFirstBirth Extrvrt Critical DpndbleSlfDispl Anxious Open Reserved

Sympathetic DisrgnzCareless Calm Uncreative ParentingStyleAverage ChildreninHHunder18 ReadTotalHoursIV  
LessonsTotalHoursIV TVTotalHoursIV

/RESIDUALS DURBIN.