Soft Skill Development in Children Born with Low Birthweight: How and Why Should Society Help?

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Abstract:
This paper brings together the existing literatures on low birthweight and soft skill development in order to demonstrate that interventions focused on soft skill development hold promise in improving the life outcomes of children born with low birthweight. First, I demonstrate that low birthweight is related to a wide range of negative life outcomes; I go on to show that interventions in soft skill development have been shown to improve many of these same outcomes. I develop a multi-tiered moral argument to support my claim that we have a societal responsibility to all children born with low birthweight. I close with a discussion of effective soft skill interventions, and how we might implement those in a way congruent with our moral responsibility.

I. Introduction

There is a great deal of literature in both economics and psychology regarding the relationship of neonatal health with both subsequent cognitive development and adult outcomes. Children who are born low birthweight, the commonly accepted measure of poor neonatal health, are more likely to experience delays in psychological development and attain less education than their peers. Beyond their schooling years, when compared to their peers, adults who were born low birthweight are less likely to be employed, are often paid less, and are more likely to have children who are also low birthweight.

In addition, there has been a recent emphasis in economic literature on the value of non-cognitive development, also known as socioemotional or "soft" skills. Rooted in psychology, these skills are indicative of personality traits that have been shown to be strong predictors of lifespan outcomes, and they are generally considered to move through a mechanism based on resilience. Research has shown an emphasis on this unique type of development, commonly referred to as "soft skills" (in contrast with "hard skills," generally measured by a standardized test), is effective at producing positive life outcomes, both psychologically and socioeconomically. Because low birthweight children face an increased risk of negative life outcomes, society has a responsibility to develop innovative interventions. I bring together the literatures on low birthweight and soft skill development in order to demonstrate that interventions focused on soft skill development hold promise in improving the life outcomes of children born with low birthweight.

a. Relevance

We must consider this phenomenon of low birthweight within a larger national context. Poverty is an epidemic facing our nation and harming no one more than our children. By conservative estimates, about 22% of children nationwide live below the

poverty line in the United States. Different measures place this figure closer to 45%.[1] While some understand poverty as a phenomenon driven strictly by financial hardship, this narrow view fails to capture a broader sense of poverty: damaged or limited capabilities to improve one's own stake in life. This notion of *capability poverty* evaluates disadvantage by considering "capabilities," what a person is *able* to do, and "functionings," what that person actually *does*, i.e. which capability or capabilities he or she chooses to select. Capability poverty can begin for a child before he or she is even born. Consider the environment in-utero, the place where a child's brain undergoes its formation and early development. This prenatal period and the neonatal period immediately following birth are indisputably important to a child's later development of capabilities. It is with this broadened sense of capability poverty in mind that we must consider the lives of children born with low birthweight.

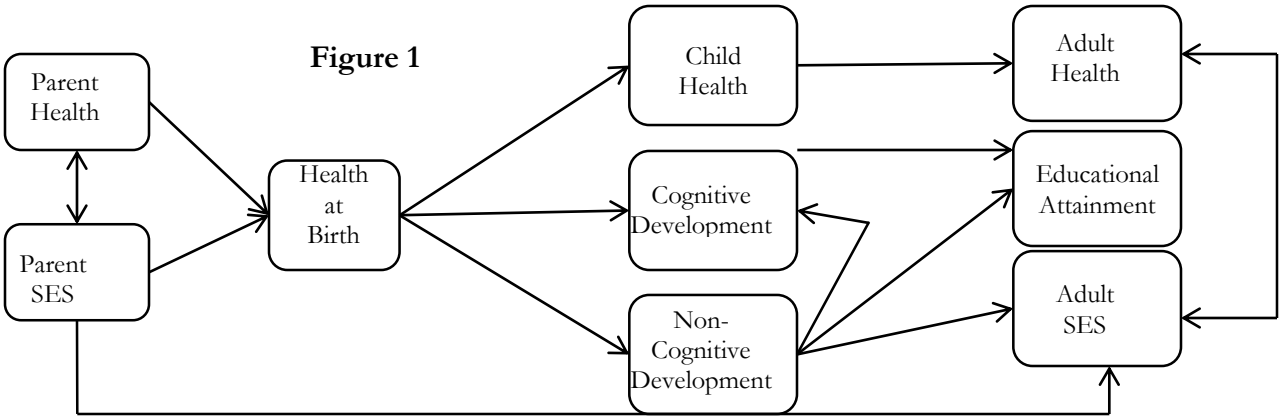
The most commonly observed effect of an in-utero environment not conducive to development is low birthweight. Low birthweight, a medical term since adopted by other disciplines, is specifically defined as a birthweight below 5.5 lbs. (regardless of the length of the gestation period). According to the CDC, 8% of all newborn children were born low birthweight in 2014.[2] Of infant health care costs in the United States, low birthweight babies account for over a third of this figure at about $3.9billion in hospitalizations each year. This is driven in large part by the difference in average hospital stays: 12.9 days for children born low birthweight versus 1.9 days for children within a normal weight range, resulting in a cost of $15,100 versus $600.[3]

While a child is developing in-utero, there are many elements that influence his or her birthweight; research has pinpointed several factors that put a child at a higher risk of

[1] National Center for Children in Poverty
[2] CDC
[3] Russell et al. (2007)

being born with low birthweight. These include maternal health and background, historical influences, as well as factors of the external environment. Barker's "fetal origins" hypothesis stipulates that many outcomes in childhood, adolescence, and adulthood stem from the critical period in-utero. Figure 1 shows a variety of pathways, from conception to adulthood, that influence adult outcomes.

Figure 1



Children born with low birthweight face an increased risk of a variety of negative life outcomes, and children who receive treatments to improve their non-cognitive development are more likely to experience improved outcomes. Because a child's birthweight is out of his or her own control, members of society have a moral obligation to intervene in an effort to improve that child's outcomes. Thus, I investigate the positive effects of a variety of interventions aimed at soft skill development as an effective set of interventions from which society can choose to improve the lives of children born with low birthweight.

II. Lifespan Outcomes of Low Birthweight

In this section, I first discuss the causes of low birthweight. These factors are important insofar as they illustrate that low birthweight is not due exclusively to what some might label "personal failings" of the child's mother. I later go on to describe a moral argument, which stipulates that society has a responsibility even to those children whose mothers' behaviors during pregnancy contributed to their stunted development in-utero. Practically speaking, the people with whom we must be concerned are the children born with low birthweight.

Let us consider a little girl, Alex, who is not yet born. In utero, her development is stunted by her mother's smoking habit. Alex is born low birthweight, through no fault of her own. At that very moment, her life trajectory has already been formed. As an infant, she may experience diminished psychological capabilities that could develop into developmental disorders. She faces lower odds at succeeding in school through all the years of her compulsory education. She may have more difficulty finding and holding down a job. She may not get married, and if she has a child, her own child may be low birthweight, starting this cycle over again. In each step of her life, Alex faces a higher probability of being met with failure than her peers who were born within a normal weight range.

a. Causes of Low Birthweight

As the baby's carrier, individual maternal habits and characteristics are closely tied to a child's low birthweight. Alex was born low birthweight in part because her mother smoked during pregnancy. Agrawal et al. (2010) found that children whose mothers smoked during pregnancy weighed 215.5g (7.6oz) less than children whose mothers were smokers but had stopped smoking during pregnancy. Illicit drug use during pregnancy is associated with many of the same physical detriments as cigarette smoking. Researchers differ in their opinions on

the level of alcohol consumption that is dangerous to a fetus; some claim that all consumption is dangerous, while others claim that only continued heavy drinking is detrimental to neo-natal health.[4] Although her mother has a causal responsibility for Alex's low birthweight, I come to argue in a later section that our moral obligations to intervene still persist for Alex.

However, low birthweight does not occur solely within children born to mothers who have detrimental habits during their pregnancy. Another wing of literature shows that there are causes of low birthweight that fall outside of a mother's behavior. The occurrence of low birthweight is not a randomly occurring phenomenon; rather, it is impacted by historical societal structures and discrimination.[5] Certain maternal background characteristics, including race, age, education level, employment, and poverty status also increase the likelihood that a child will be born low birthweight. Through this these trends, rooted in SES, we can begin to see that disadvantage compounds itself. Black mothers are the most likely demographic to have children born with low birthweight with an incidence rate of 13.15%, almost twice the rate of low birthweight births among white mothers.[6] In addition, teens, along with women over the age of 35, are at a higher risk of having a low birthweight baby. One additional year of maternal higher education "reduces the incidence of low birthweight by 10%," and maternal use of social programs like WIC lowers the proportion of low birthweight babies by one percent.[7] Lastly, when controlling for maternal

[4] da Costa Pereira et al. (1993) and Windham et al. (1995)
[5] Though it is outside the scope of this paper, it is important to note that differences in low birthweight incidence rates among different populations cannot be attributed to differences in "culture."
[6] Brooks-Gunn and Duncan (1999)
[7] Currie (2011)

age, education, marriage, and smoking, research finds that children who are born into families that fall under the poverty line are 80% more likely to be born low birthweight.[8]

Having been low birthweight herself, Alex is more likely to give birth to children who are low birthweight. In fact, her own low birthweight status accounts for 46% of the probability that she will have a low birthweight child.[9] It is clear that the risk of some groups is higher than others; in particular, minority and low-socioeconomic status mothers who were born with low birthweight themselves are even more likely to have low birthweight children. Lastly, external factors such as maternal exposure to pollution, food shortage, or exposure to an infectious disease during the period of fetal development mean that a child is more likely to be born low birthweight.[10]

b. Health and Psychological Outcomes

Notwithstanding the growing literature on the causes of low birthweight, the outcomes of children like Alex are more important for the considerations of this paper. We are concerned with the points at which interventions might be effective *after* a child is born with low birthweight. Thus, in the following sections, I explain the lifelong outcomes that are impacted by low birthweight.

Initially, the negative effects of Alex's low birthweight are limited to her. From the moment of her birth, Alex is 24 times more likely to pass away before her first birthday than if she had been born at a more normal weight.[11] She is at a significantly increased risk of experiencing neurodevelopmental problems and insensitivity, including delays and deficits in cognition, attention, and neuro-motor functioning. Even if Alex does not struggle with neurodevelopmental problems, she may face health issues as a child that could follow her

[8] Starfield et al. (1991) and CDC
[9] Currie and Moretti (2005)
[10] Currie (2011), Douglas and Currie (2011), Almond, Currie, Herrman (2012)
[11] CDC

into adulthood. Because her mother smoked, Alex is about 500% more likely than her peers to be obese by age 5, and approximately 260% more likely than her peers to be obese from age 9-10.[12] Alex's childhood health will likely be impacted by her low birthweight, as will her adult health. Mzayek et al. (2009) find that "low birthweight has been found to be associated with cardiovascular mortality and morbidity and with an adverse profile of several cardiovascular risk factors," including diabetes, heart disease, high blood pressure, or metabolic syndrome. In addition, Alex will be 4.2-15.2 percentage points more likely to develop asthma over the course of her adult life, which might impede her ability to exercise and could exacerbate other health problems.

c. Socioeconomic Outcomes

While Alex is more likely to exhibit cognitive delays related to hear health, her compulsory schooling years, educational attainment, and subsequent socioeconomic status might be negatively impacted in other ways. Hack et al. (1995) finds that the observed disadvantage in education that is associated with low birthweight "persists into early adulthood." Regardless of their mother's background, children with low birthweight are one demographic that is at a higher risk for educational failure; they are more likely to be enrolled in special education classes, and they have a high probability of repeating a grade than their counterparts.[13] Alex is over 33% more likely than her normal birthweight counterparts to drop out of high school. Figlio et al. (2013) find that for both twins and singletons, "the effects of birth weight on cognitive development are roughly constant across a child's schooling career." Their results "suggest that the gaps observed in adulthood associated with poor neonatal health are largely fixed at least by third grade or even kindergarten, indicating

[12] Almond and Currie (2011), Lee et al. (2009) McCarthy et al. (2007), TFCO (2012)
[13] Agrawal et al. (2010), Almond (2006), Corman (1991), Corman and Chaikind (1993), Currie and Hyson (1999), Currie and Moretti (2005), Hack et al (1995).

that some neonatal health deficits may be very difficult to overcome." These negative effects of low birthweight are apparent in employment as well. Even if she does graduate from high school, when compared with her peers, Alex's low birthweight is predictive of receiving lower earnings, regardless of parental socioeconomic status. Currie and Hyson (1999) find that at age 33, adults who were born low birthweight are more likely to be unemployed, and still other studies find that those adults born low birthweight that do participate in the labor force earn over 15% less than their counterparts. Because of her low birthweight status, Alex is over 5% less likely to participate in the labor force at all.[14]

If Alex has children, as a mother who was born low birthweight, she is more likely to both live in a low-income neighborhood or high poverty zip code and have less education than her sisters at the time they gave birth to their own children.[15] This finding illustrates that the effects of low birthweight impact future socioeconomic status and have intergenerational effects.

[14] Johnson and Schoeni (2007)
[15] Currie and Moretti (2005)

III. Lifespan Outcomes of Soft Skill Development

In order to understand why soft skill interventions would be policies that are both morally required and effective in combatting the negative effects of low birthweight, we must first explore how soft skill development positively impacts the life outcomes with which we are concerned.

From the moment she is born, Alex will begin to develop her personality traits, which in of themselves will begin to shape her life's trajectory. The development of her personality will impact her success in school, in the labor market, and in the social sphere. She will fall somewhere on a spectrum from low to high for each of five soft skills, which are detailed in Table 1 below. A high ranking on the spectrum for each of the first four of these skills (openness to new experiences, conscientiousness, extraversion, and agreeableness) is considered a positive outcome, whereas a high ranking on neuroticism is considered a negative outcome. Heckman and Kautz (2012) consider these five skills to be the "longitude and latitude of personality, by which all more narrowly defined traits may be categorized."

Table 1: Soft Skills and Associated Adult Outcomes

Soft Skills	Definitions	Correlation with Adult Outcomes
Openness to Experience	"The tendency to be open to new aesthetic, cultural, or intellectual experiences"	+
Conscientiousness	"The tendency to be organized, responsible, and hardworking"	++
Extroversion	"An orientation of one's interests and energies toward the outer world and things… characterized by positive affect and sociability	+
Agreeableness	"The tendency to act an a cooperative, unselfish manner"	+
Neuroticism	"A chronic level of emotional instability and proneness to psychological distress"	- (Emotional Stability is +)

These personality traits begin impacting an individual's outcomes early – they are influential in school-based measures of success from an early age, such as achievement test scores and grades. Heckman and Kautz (2012) find that "personality traits predict many later-life outcomes [earnings, hourly wage, incarceration, welfare, marriage, and mental health] as strongly as measures of cognitive ability." They go on to say that "personality traits can be changed by intervention, and interventions that target personality are promising."

Each of the Big Five soft skills nurtures a specific component of personality that is meaningful later in life:

Openness is connected with creativity in the workplace; people who exhibit openness are more likely to be creative problem solvers. This trait is also most strongly correlated with standardized measures of intelligence.

"Conscientiousness – the tendency to be perseverant and hardworking – stands out as most predictive of the Big Five;" it is significantly correlated with educational attainment and achievement, overall health, and favorable labor market outcomes.[16] In particular, conscientiousness predicts educational attainment and achievement more than many measures of intelligence and cognitive development.

Extraversion is beneficial in each step of life, from elementary school to the workplace, for creating and maintaining relationships. This soft skill is most predictive of common leadership traits, and is highly correlated with strong information-processing abilities.

[16] Heckman and Kautz (2012)

Agreeableness, "the ability to adapt," is characterized by an individual's ability to put a positive spin on an otherwise negative situation. In addition, these individuals exercise an unmatched "willingness to adapt to and understand their environment."[17]

Lastly, neuroticism is correlated with lower levels of overall happiness and self-confidence. Emotional stability, the inverse of neuroticism, is correlated with higher lifelong levels of happiness, as well as a higher baseline level of happiness.

The pathways from non-cognitive development of each of these soft skills to cognitive development, educational attainment, and adult socioeconomic status are well established. Controlling for education, research shows that soft skills directly affect the likelihood of teen pregnancy (a high risk factor for a child to be born low birthweight), smoking (also a risk factor), wages, crime, and performance on achievement tests.[18] Preliminary research even suggests that these skills affect health choices and may thus influence adult health. There is little research on the mechanisms that impact soft skill development. El Bono and Ermisch (2009) test this pathway using British data and find mild, but significant, effects of low birthweight on soft skill development. My own research for my Economics 399 Capstone has similar findings, using data from the United States.

[17] ETS
[18] Heckman (2007)

IV. Moral Obligations to Children Born with Low Birthweight

The literature shows that soft skill development positively impacts many of the same life outcomes that low birthweight negatively impacts. As the previous section illustrates, soft skill development has relevance for anti-poverty efforts: insofar as Alex's soft skills are developed, she is more likely to be employed, and less likely to receive welfare. However, within the capabilities approach, anti-poverty efforts must focus on more than just dollars. Martha Nussbaum extends Amartya Sen's capability approach to include an understanding of human dignity, which "is equal in all [from the start]"—irrespective of potential. Nussbaum details the ten "central" capabilities, which play a central role in securing a minimum level of continued human dignity.[19] Perhaps least controversial among these ten is her stipulation that humans have the right to bodily health. As I have shown, a child born with low birthweight is predisposed toward health problems; thus, low birthweight impedes the development of this capability. Similar arguments can be made to show that low birthweight hinders many of the other central capabilities. While low birthweight is a detriment to capabilities, soft skill development is able to improve capabilities. Because society has an obligation to support a certain level of capabilities whenever possible, soft skill development is an effective means through which society can fulfill this obligation.

a. Opportunity-Based Approach

An alternative argument can be made in favor of developing soft skills for children born with low birthweight with the claim that a fair and just society would ensure the provision of opportunity for children. The American political ideology's focus on providing opportunities, rather than outcomes, is not only compatible with, but also parallel to the

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[19] Nussbaum 33-4
Central Capabilities: Life; bodily health; bodily integrity; senses, imagination, and thought; emotions; practical reason; affiliation; other species; play; and control over one's environment

capabilities argument of prioritizing capabilities over functionings. Rawls' argument for justice through fair equality of opportunity is set forth in his book *A Theory of Justice*.

To illustrate fair equality of opportunity, Rawls has his readers imagine an ideal contracting situation in which all contractors are both unbiased and self-interested. Contractors are behind a "veil of ignorance" as they build a normal (non-utopic) society. Behind this "veil," contractors are unaware of the position they will hold in society once it has been created (unbiased), and therefore want to ensure that they maximize the well being of each possible societal position (self-interested). Whatever these unbiased, self-interested contractors agree to behind the veil, Rawls considers *just*. He goes on to say that in order "to provide genuine equality of opportunity, society must give more attention to those with fewer native assets and to those born into less favorable social positions."

With low birthweight, genuine fair equality of opportunity is rendered impossible from the moment of birth. From behind the veil, contractors who are self-interested would agree that there ought to be some safety net in place to restore fair equality of opportunity, to the greatest degree possible, to children who are born low birthweight. Rawls' principles allow for this; he suggests, "greater resources might be spent on the education of the less rather than the more… at least over a certain time in life, say the earlier years of school." If by allocating resources to education, we "improve the long-term expectation of the least favored," we are fulfilling our responsibility. Within the context of this paper, education is one subset of an array of interventions aimed at improving the long-term expectations of children born with low birthweight. Rawls goes on to point out "the value of education should not be assessed only in terms of economic efficiency and social welfare. Equally if not more important is the role of education in enabling a person to enjoy the culture of his society and to take part in its affairs, and in this way to provide for each individual a secure

sense of his own worth." In seeking to equalize opportunity outside of the narrow definition of income, Rawls' theory is in keeping with the capabilities approach.

Alternatively, some may think that it is a parent's personal responsibility to ensure their child's health, and there are indeed some instances in which low birthweight can be considered a direct result of a mother's explicit actions and choices during her pregnancy. It is important to consider that circumstances may exist where there is no one individual who is causally responsible for a child being born with low birthweight. Some of these environmental factors, as discussed earlier in the paper, include maternal malnourishment, exposure to pollution, or illness. In addition, there are certain structural factors in American society that predispose women toward having children born low birthweight: race, education level, and social class, among others. There is no doubt that we have a responsibility to these children. Yet these critiques may argue that society has no moral obligation to help children born with low birthweight as a result of their mother's personal failings; they will claim that because she has causal responsibility, she must bear moral responsibility as well. In response to this view, Iris Marion Young's conception of political responsibility brings to light a widespread societal obligation to *all* children born with low birthweight.

Young claims that the liability model alone, in which moral responsibility would fall upon the individual with causal responsibility, is insufficient in capturing the full range of moral responsibility. In the case of low birthweight in particular, the liability model falls short in two ways. First, this model "reviews the history of events in order to assign responsibility, often for the sake of exacting punishment or compensation." Our aim in intervening for children born with low birthweight is not to punish their mothers for poor habits during pregnancy, but to improve those children's capabilities. Second, this model's assignment of "responsibility to some agents… usually also has the function of absolving

other agents who might have been candidates for fault." Because in-utero development is so susceptible to environmental influences, it is somewhere between unlikely and impossible for one factor to be identified as singularly causal for low birthweight. Further, because low birthweight is so strongly correlated with existing societal structures of inequality, there is a certain degree of societal responsibility inherent in the birth of every child with low birthweight.

My proposed response fits with each facet of Young's model of political responsibility. Soft skill interventions are forward-looing in terms of policy development, but their specifics are not explicitly prescribed; rather there is a range of appropriate interventions that may fulfill our shared responsibility. Having demonstrated that we have an individual and societal responsibility to improve the lives of children born with low birthweight, we must consider the most effective ways to achieve this end.

b. Considerations of Costs and Benefits

When considering real-world means through which we can intervene in the lives of children born with low birthweight, a cost-benefit analysis is necessary; a moral argument for any intervention without a feasible policy argument is impractical. There are some who might argue that the government need not intervene in the lives of children born with low birthweight. However, they are failing to take into consideration the widespread, long-term political consensus that America is the land of opportunity, a country in which children are unfettered by their background and can achieve success through hard work and determination. To maintain this ideology in America, and to ensure it is more than political rhetoric, we need to put our money where out mouth is and implement policies to help children.

There's no two ways about it – policies that focus on soft skill development are costly. However, each dollar invested into children has much larger monetary and societal payoffs in the long run. Heckman (2013) finds that the rate of return (annual return on each dollar spent) to intensive pre-school programs is between 6 and 10%. Masse and Barnett (2002) found that the $34,599 cost of pre-K for each participant ultimately led to a $72, 591 benefit when focusing on wage and employment. These benefits are more than just monetary; they also carry societal benefits. Children who receive effective interventions in their soft skill development are less likely to be incarcerated, more likely to be married before they have children, and more likely to be employed (and therefore paying taxes).[20]

It is important to note that while these policies are costly, they do not exclusively impact children who are born low birthweight. Rather, if the interventions were designed to be targeted at a wider audience, all children would be positively affected by their implementation. For children who are already at a disadvantage, including those who are born low birthweight, the benefits accrued are even greater. In addition, Heckman (2013) points out that these early interventions, while costly, provide a strong foundation on which later investments (in education, job training, health, etc.) can stand. Our responsibility to intervene, along with our ability to do so without incurring undue costs, informs the range of soft skill interventions we consider.

[20] Heckman (2007)

V. Programs for Soft Skill Development

I have illustrated our moral responsibility to strive to improve the lives of children born with low birthweight. Because soft skill development possesses the potential to remediate the negative effects of low birthweight, I explore an array of interventions aimed at improving life outcomes through the mechanism of soft skill development. Development of the Big Five soft skills is closely tied to improvements in an individual's central capabilities.

a. Motivation

Soft skill development can be prioritized because it influences both health and cognitive development. An increase in the positive factors in Big Five is associated with increases in self-control and farsightedness; these people often have healthier behaviors, follow medical instructions more closely, and take generally better care of themselves. Heckman (2007) points out that, within children, "personality traits foster the development of cognition, but not vise versa." He suggests that the significant long-term positive effect on IQ that many studies find is in part due to unmeasured or omitted considerations of soft skill development, especially conscientiousness. Thus, we can see that soft skill development is pervasive and in fact influential on other types of development.

The degree to which Alex is affected by her low birthweight is dictated by the quality of any interventions she may have received. Starting from her conception, there are opportunities for interventions that will combat the negative effects of Alex's low birthweight. One way to mediate the negative effects of low birthweight is to engage in primary preventions – interventions that occur in a high-risk group before the disorder of concern has developed.[21] While there is a promising body of literature on these prenatal

[21] Shonkoff and Meisels (2000)

interventions, and attention should certainly be given to preventative measures, there can be no doubt that children will continue to be born with low birthweight. Instead of focusing on changes to the mother's lifestyle during pregnancy, soft skill interventions are intent on developing the life outcomes for children once they are born. Given our knowledge about neurological development, these interventions should take place early in the life cycle. There is a critical period between infancy and early childhood in which children are more malleable and responsive to treatments. Following this period, interventions on soft skills are more costly and produce less significant outcomes – without a strong foundation to build upon, soft skill development is difficult to foster.[22] In a study of these later interventions, Heckman (2007) reports "performance of disadvantaged children was still behind the performance of children who also experienced interventions in the preschool years." In addition, soft skills are dynamically complementary, which is to say that Alex's personality in childhood affects the formation of her soft skills through both direct and cross effects.

One might ask if we can be certain that interventions in soft skill development are a viable option for children born with low birthweight. The Infant Health and Development Program (IHDP), a randomized trial across the United States, exclusively targeted children born with low birthweight from birth to age three. The IHDP took a three-pronged approach in its intervention, providing home visits, enrollment in early child education centers, and parent support meetings. The primary question explored by the IHDP was whether changes in parenting would promote positive long-term outcomes in IQ. The data collected included both IQ and behavioral measures. Behavioral measures can be used to proxy soft skill development in infants, though behavioral measures become poorer proxies for soft skills as children get older. IHDP found that long-term positive changes in IQ are

[22] Heckman (2007)

significant, but authors diverge on whether behavioral outcomes retain their significance after the child was no longer enrolled at the childcare center.[23] Though there is disagreement on the longevity of behavioral effects, the fact that IHDP had any effects on child behavior informs our ability to consider soft-skill focused interventions as a viable option for low birthweight children.

b. Specific Interventions

A growing body of literature shows that there is a wide range of ways in which children's life outcomes are positively impacted by early-life interventions in soft skill development. These treatments may be effective as "secondary preventions" in the negative effects of low birthweight – interventions that aim to bring about change after the disorder (low birthweight) has been identified, but before it has caused disability (brought about negative life outcomes).[24] In our consideration of how to best develop soft skills for children born low birthweight, there are two main types of secondary preventions: those aimed at the parents and those aimed at the children affected, which generally take place in the home and the school respectively. Table 2 summarizes twelve effective interventions that target soft skill development. The remainder of this section will discuss what makes these programs the "model" programs of soft skill development.

These interventions all take place between birth and age 8, the timeframe generally considered to encapsulate the "critical period" of development in early childhood. In this span of eight years, children are most malleable and most responsive to interventions. Thus, it is not surprising that the most effective programs target children in this period of childhood development.

[23] Liaw et al. (1995), Currie and Rossin-Slater (2014), Hill et al. (2003)
[24] Shonkoff and Meisels (2000)

Table 2: Summary of Soft Skill Interventions			
Intervention	**Age**	**Home**	**School**
The Incredible Years	Birth - 8 years	X	X
Abecedarian Project	Birth - 5 years	X	X
Parent Child Development Center	Birth - 3 years	X	
Child Development Accounts (CDA)	Birth	X	
Infant-Net	6 - 10 months	X	
"Responsive Parenting"	6 - 10 months	X	
Student-Teacher Achievement Ratio (STAR)	5 - 8 years		X
Tools of the Mind	3 - 8 years		X
High/Scope Perry Preschool Project	3 - 4 years	X	X
Montessori	3 - 4 years		X
Head Start	3 - 4 years		X

Three different classifications of interventions can be made: exclusively home-based, a combination of home and school, and exclusively school-based. I will discuss these broad categories in this order, as they generally follow chronological development. First, I will describe the most notable tenets of these broad types of interventions; I will go on to highlight uniquely successful aspects of specific interventions within that broad category. Though it is outside the scope of this paper to identify the exact mechanisms through which soft skill development occurs in these interventions, I consider several prevalent schools of thought on this matter. .

Home-based interventions generally focus on developing appropriate parent-child interactions and building a strong relationship, rooted in authoritative parenting. Parker (1989) details the positive outcomes generally associated with authoritative parenting, which is high in both warmth and discipline. The other styles: authoritarian (low in warmth, high in discipline), permissive (high in warmth, low in discipline), and uninvolved (low in both warmth and discipline) do not show the strong positive outcomes associated with authoritative parenting and are tied to specific negative outcomes. These home-based

programs are generally implemented in a way that directs the treatment toward a population that is particularly at-risk. Infant-Net and "Responsive Parenting" followed the same format: an hour and a half of guided "playing and learning strategies" (PALS) over the course of 10 weeks. PALS used videos to model infant "target behaviors" in order to a) teach mothers how to identify these behaviors and b) provide examples of appropriate feedback to reinforce the target behaviors.[25] The main distinction was in the delivery of the two programs; Infant-Net was delivered entirely over the computer and phone calls, whereas "Responsive Parenting" involved a facilitator entering the home each week. Landry et al. (2006) explain that through "improvements" in parenting style, children showed improvements in extraversion, agreeableness, and openness, along with decreased neuroticism. Though the specific data was not collected, these findings suggest that conscientiousness would also have been improved by the PALS intervention.

One particularly unique home-based program, Child Development Accounts, was tested in Oklahoma in 2007. CDAs are accounts opened at a child's birth; the assets in the account can only be used for a limited range of purposes (education, homeownership, and other development). The rationale behind CDAs is that "asset holding positively affects child development… [and] influences multiple aspects of child well-being, including social-emotional development." The experiment showed shockingly significant effects related to CDAs opened at birth; the authors claimed that these effects "can be explained by influences on parental attitudes, behaviors, and involvement… the intervention motivates mothers, especially those with disadvantaged backgrounds, to raise their expectations and increase support for children's education in the precollege years."[26] The authors found that socioemotional functioning, most fully capturing conscientiousness, improves 8% of a

[25] Baggett et al. (2010) and Landry et al. (2006)
[26] Huang et al. (2014)

standard deviation within the full sample, and between 20-25% within the low socioeconomic status subsample.

The Parent-Child Development Center model was explored in the early 1970s as a precursor to many of the interventions targeting both the home and the school.[27] It aimed to provide a broad range of services to families in poverty; this model was most successful in streamlining the resources available to families and laying the framework for more targeted programs. These more targeted programs straddled the line between home- and school-based interventions. Most of these programs sought to take the most practical facets of the home-visit programs and combined them with some iteration of early education. The most notable of these interventions were the High/Scope Perry Preschool Project and the Abecedarian Project. Both of these programs included home visits with a focus on improving parent interactions with their child and enrollment at intensive, health-focused early childhood education centers. These studies are so widely discussed because their experimental designs and data collection methods allow researchers to compare across interventions with varied intensity as well as observe long-term educational and adulthood outcomes.

The two projects used slightly different approaches; Perry focused on teaching its students problem-solving skills, while Abecedarian prioritized language acquisition and development. Though the programs focused on different aspects of academic learning, both Perry and Abecedarian saw similarly significant levels of soft skill development. These soft skills manifested themselves in a decreased likelihood of special education, teen pregnancy, adolescent smoking / drug use, and interactions with the criminal justice system. Further, the students in these programs were more likely to achieve in school, go on to college, and to

[27] Hertzman and Wiens (2006)

have employment, including increased odds of a higher status employment, throughout their adulthood.[28] The Incredible Years Program expanded PALS' effective home-based video modeling methodology into the classroom – it introduced video models for both students and their teachers.[29] This created an unprecedented unity across the messages that students were receiving in both their homes and schools, as well as improvements within conscientiousness, extraversion, and agreeableness.[30]

Exclusively school-based programs have been emphasized as a broad approach to anti-poverty efforts since 1965, when President Lyndon B. Johnson established Head Start as a part of his "War on Poverty." Charged with improving low-income children's "cognitive, social, and emotional development," Head Start provided pre-K for communities that had previously not had access to such programs. While Head Start is often cast as an ineffective government program because its effects on standardized test scores did not last beyond elementary school, it has been shown to decrease enrollment in special education, increase the likelihood of high school graduation, college attendance, and decrease the likelihood of incarceration. These striking effects of Head Start are even more notable when considering the research method used – children were compared with their own siblings; it is likely that the largest difference in their upbringing was their pre-K attendance.

Montessori pre-K programs, which center on student freedom, self-regulation, and peer modeling, produce effects similar to Head Start. Cognitive test score "fade out" effects indicate that the observed differences are causally related to increased soft skill development.[31] These and other approaches to early childhood education produce even

[28] Heckman (2007), Ramey and Ramey (2004), Currie and Rossin-Slater (2014), Heckman and Kautz (2012)
[29] Baggett et al. (2010)
[30] Saxena et al. (2006)
[31] Hertzman and Wiens (1996)

greater outcomes when they are followed by quality primary education.[32] A study in Tennessee in the mid- to late-1980s on the most appropriate Student-Teacher Achievement Ratio, commonly known as Project STAR, tested the impacts of kindergarten through third grade interventions.[33] Smaller class sizes were found to be beneficial for developing extraversion, openness, and conscientiousness in all children, but the effects were larger for those who had attended pre-K. Thus, we can see that dynamic complementarity, improved outcomes because of preexisting foundations, is an important consideration in developing policies targeting soft skill development.

Because soft skill development can benefit from certain interventions which impact life outcomes, we must select components of these interventions that can be built into policies aimed at improving the life outcomes of children born with low birthweight.

[32] Baggett et al. (2010), American Montessori Society

[33] It is important to note that Project STAR targeted the oldest children we are considering to still be within the critical period of early childhood development. (American Youth Policy Forum)

VI. Conclusions

In this paper, I have described the programs that impact soft skill development and described the societal obligation to provide such interventions for children who are born with low birthweight. Because incidences of low birthweight cannot be eliminated by an individual's actions, I concern myself not with preventative measures to combat the incidence rate of low birthweight, but rather with what steps can be taken after a child is born into a situation not of his or her own making.

Early interventions focusing on soft skill development would be particularly effective because they combat many of the negative life outcomes that are associated with low birthweight. To be effective, these interventions should meet several requirements. First, they must attack the critical period of development, the time between infancy and age eight. Second, the most robust interventions would be pluralistic, involving both home- and school-based facets. Lastly, they should build off of the frameworks in place from preexisting interventions.

There is no need to reinvent the wheel; we can simply modify it to better suit our aims. As a government initiative used across the United States, Head Start provides a promising starting point and a fine example to display the pliability of this argument. Let us consider ways in which Head Start's framework could be modified to reflect that of pre-K programs shown to produce even more significant outcomes. We might consider incorporating a health-focused home-visitation component to Head Start (like that of Perry Preschool and Abecedarian), or an at-home parental training program (based off of PALS and Infant-Net). Head Start teacher training and classroom adult-child ratios could begin to resemble those of Project STAR, or we might consider taking a more radical approach by including the option of opening a child development account when enrolling in Head Start.

It is clear that there is a wide variety of ways we might go about fulfilling our societal responsibility to improve the soft skills of children born low birthweight. The above description of modifications to Head Start is simply a drawn-out example of the range of possibilities that are available to us. While Head Start is a national large-scale program, there are preexisting community-based programs that are effective means to produce local-level changes in the lives of the children with whom we are concerned.

Again, there is no doubt that the implementation of any of these programs will incur costs. However, the long-term benefits are more than enough to outweigh the initial expenditure. Small, local programs have concentrated benefits, whereas large-scale, national programs have more diluted, but still measureable, positive impacts on life outcomes. It is important to keep in mind that we have not yet identified the mechanism through which soft skill development impacts the life outcomes of low birthweight children. As such, we may see certain programs become resounding successes while others produce more modest, or even unobserved, outcomes. We have been able to identify the interventions outlined above because of decades of research, experimentation, and observation. Thus, as we move forward in our efforts to improve the lives of low birthweight children, we must remain patient and keep our eyes set upon the goal of providing improved capabilities for some of the least among us.

VII. Works Cited

Agrawal, Arpana, Jeffrey F. Scherre, Julia D. Grant, Carolyn E. Sartor, Michele L. Pergadia, Alexis E. Duncan, Pamela A.F. Madden, Jon Randolph Haber, Theodore Jacob, Kathleen K. Bucholz, and Hong Xian. "The effects of maternal smoking during pregnancy on offspring outcomes." *Preventive Medicine* 2010 50: 13-18.

Almond, Douglas. "Is the 1918 Influenza Pandemic Over? Long-Term Effects of In Utero Influenza Exposure in the Post-1940 U.S. Population." *Journal of Political Economy* 2006 114(4): 672-712

Almond, Douglas, and Janet Currie. "Killing Me Softly: The Fetal Origins Hypothesis." *Journal of Economic Perspectives*, 2011 25(3): 153-72.

Almond, Douglas, Janet Currie, and Mariesa Herrmann. "From infant to mother: Early disease environment and future maternal health." *Labor Economics*, 2012 19: 475–483.

American Montessori Society. "Benefits of Montessori." http://amshq.org/Montessori-Education/Introduction-to-Montessori/Benefits-of-Montessori

Baggett, Kathleen, Betsy Davis, Edward Feil, Lisa Sheeber, Susan Landry, Judith Carta, and Craig Leve. "Technologies for Expanding the Reach of Evidence-Based Interventions: Preliminary Results for Promoting Social-Emotional Development in Early Childhood." *Topics in Early Childhood Special Education* 2010 29(4): 226-38.

Brooks-Gunn and Duncan. "The Effects of Poverty on Children" *The Future of Children* 1999.

CDC. "Beyond 20/20 Web Data Server." *National Vital Statistics System.*

CDC. "Tobacco use and Pregnancy." http://www.cdc.gov/reproductivehealth/maternalinfanthealth/tobaccousepregnancy/index.htm

Corman, H. "The impact of low birth weight on special education costs." *Journal of Health Economics* 1991 (10): 291-311.

Corman, H., and Chaikind, S. "The effect of low birth weight on the health, behavior and school performance of school-aged children." NBER Working Paper (1993): 4409.

Currie, Janet. "Inequality at Birth: Some Causes and Consequences." NBER Working Paper (2011): 16798.

Currie, Janet, and Rosemary Hyson. "Is the impact of health shocks cushioned by socioeconomic status? The case of low birthweight." NBER Working Paper (1999): 6999.

Currie, Janet, and Maya Rossin-Slater. "Early Life Origins of Life Cycle Well Being: Research and Policy Implications." *Journal of Policy Analysis and Management* 2015 34(1): 208-242.

Currie, Janet, and Enrico Moretti. "Biology as destiny? Short and long-run determinants of intergenerational transmission of birth weight." NBER 2005 Working Paper 11567.

da Costa Pereira, Altamiro, Jørn Olsen and Simon Ogston. "Variability of Self Reported Measures of Alcohol Consumption: Implications for the Association between Drinking in Pregnancy and Birth Weight." *Journal of Epidemiology and Community Health* 1993 47(4): 326-330.

El-Mohandes, Ayman, Allen A. Herman, M. Nabil El-Khorazaty, Pragathi S. Katta, Davene White, Lawrence Grylack. "Prenatal Care Reduces the Impact of Illicit Drug use on Perinatal Outcomes." *Journal of Perinatology* 2003 23: 354-360.

ETS. "Workforce Readiness." https://www.ets.org/s/workforce_readiness/pdf/21334_big_5.pdf

Figlio, David, Jonathan Guryan, Krzysztof Karbownik, and Jeffrey Roth. "The Effects of Poor Neonatal Health on Children's Cognitive Development." Unpublished: October 2013.

Hack, Maureen, Nancy K. Klein, and H. Gerry Taylor. "Long-Term Developmental Outcomes of Low Birth Weight Infants." *The Future of Children* 1995 5(1): 176-196.

Hamilton, Brady E, Joyce A. Martin, Michelle J.K. Osterman, Sally C. Curtin, and T.J. Mathews. "Births: Final Data for 2014." *National Statistics Report* 2015 64(12).

Heckman, James. "Giving Kids A Fair Chance." *The MIT Press* 2013.

Heckman, James. "The economics, technology, and neuroscience of human capability formation." *PNAS* 2007 104(33):13250-55.

Heckman, James and Tim Kautz. "Hard evidence on soft skills." *Labor Economics* 2012 19: 451-464.

Hertzman, C, and Wiens. "Child Development and Long Term Outcomes: A Population Health Perspective and Summary of Successful Interventions." *Soc. Sci. Med.* 1996 43(7): 1083-95.

Hill, Jennifer, Jane Waldfogel and Jeanne Brooks-Gunn. 2003. "Sustained Effects of High Participation in an Early Intervention for Low-Birth-Weight Premature Infants." *Developmental Psychology*, 39(4): 730-744.

Huang, Jin, Michael Sherraden, Youngmi Kim, Margaret Clancy. "Effects of Child Development Accounts on Early Social-Emotional Development: An Experimental Test." *JAMA Pediatr.* 2014 168(3): 265-71.

Johnson, Rucker C. and Robert F. Schoeni. "The Influence of Early-Life Events on Human Capital, Health Status, and Labor Market Outcomes Over the Life Course." Working Paper Series 2007.

Landry, Susan, Karen Smith, and Paul Swank. "Responsive Parenting: Establishing Early Foundations for Social, Communication, and Independent Problem-Solving Skills." *Developmental Psychology* 2006 42(4): 627-642.

Lee, Eunju, Susan D. Mitchell-Herzfeld, Ann A. Lowenfels, Rose Greene, Vajeera Dorabawila, and Kimberly A. DuMont. "Reducing Low Birth Weight Through Home Visitation: A Randomized Controlled Trial" *Am J Prev Med* 2009 36(2): 154-160.

Liaw, Fong-ruey, Samuel J. Meisesls, Jeanne Brooks-Gunn. "The Effects of Experience of Early Intervention on Low Birth Weight, Premature Children: The Infant Health and Development Program." *Early Childhood Research Quarterly* 1995 10: 405-431.

T.J. Mathews, and Marian F. MacDorman. "Infant Mortality Statistics from the 2010 Period Linked Birth/Infant Death Data Set." *National Statistics Report* 2013 62(8).

McCarthy, Anne, Rachael Hughes, Kate Tilling, David Davies, George Davey Smith, and Yoav Ben-Shlomo. "Birth weight; postnatal, infant, and childhood growth; and obesity in young adulthood: evidence from the Barry Caerphilly Growth Study." *The American Journal of Clinical Nutrition* 2007 86: 907–13.

Mzayek, F., S. Hassig, R. Sherwin, J. Hughes, W. Chen, S. Srinivasan, and G. Berenson. "The Association of Birth Weight with Developmental Trends in Blood Pressure from Childhood through Mid-Adulthood." American Journal of Epidemiology Advancement 2007.

National Center for Children in Poverty. "Child Poverty." http://www.nccp.org/topics/childpoverty.html

Nussbaum, Martha. "Creating Capabilities: The Human Development Approach." *Harvard University Press* 2011: 17-45.

Parker, Gordon. "The Parental Bonding Instrument: Psychometric Properties Reviewed." *Psychiatric Developments* 1989 4: 317-335.

Ramey, Craig and Sharon Ramey. "Early Learning and School Readiness: Can Early Intervention Make a Difference?" *Merrill-Palmer Quarterly* 2004 50(4): 471-91.

Rawls, John. "A Theory of Justice." *Harvard University Press* 1971" 3-4, 11-15, 18-19, 60-62, 64-65, 100-104.

Robins, LN, Mills JL, and Krulewitch C. "Effects of in Utero Exposure to Street Drugs." *American Journal of Public Health* 1993 83: 1–32.

Russell, R. B., N. S. Green, C. A. Steiner, S. Meikle, J. L. Howse, K. Poschman, T. Dias, L. Potetz, and M. J. Davidoff. "Cost of hospitalization for preterm and low birth weight infants in the United States." *Pediatrics* 2007.

Saxena, Shekhar, Eva Jané-Llopis, and Clemens Hosman. "Prevention of mental and behavioural disorders: implications for policy and practice." *World Psychiatry* 2006.

Shonkoff, Jack P. and Samuel J. Meisels. "The Handbook of Early Childhood Intervention." *Cambridge University Press* 2000.

Starfield, B, S. Shapiro, J. Weiss, K. Y. Liang, K. Ra, D. Paige, and X. B. Wang. "Race, family income, and low birth weight." *American journal of epidemiology* 1991.

Twin Cities Health Professionals Education Consortium. (TFCO) "Fetal Alcohol Syndrome." 2012

Windham, Gayle C., Laura Fenster, Barbara Hopkins and Shanna H. Swan. "The Association of Moderate Maternal and Paternal Alcohol Consumption with Birthweight and Gestational Age." *Epidemiology* 1995 6(6): 591-597.

Young, Iris Marion. "Responsibility and Global Labor Justice." *The Journal of Political Philosophy* 2004 12(4): 365-88.

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