

# Ready To Be Counted:

The Research Case for Education Policy Action  
on Non-Cognitive Skills

A Working Paper by Chris Gabrieli, Dana Ansel, PhD,  
and Sara Bartolino Krachman

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**v1.0 December 2015**



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Note that the views expressed in this paper do not necessarily reflect those of EFCT or the members of our National Advisory Board; any errors in fact and interpretation are our own.

## ABOUT OUR WORKING PAPERS

Transforming Education is pleased to issue a series of working papers that are meant to distill information of value to educators, policymakers, and others in the field of Mindsets, Essential Skills, & Habits (MESH) in a form that can be readily updated as knowledge continues to emerge and be refined. Our working papers summarize the current state of knowledge and evidence about which skills matter for success in school, college, career, and life; how we can responsibly measure and build those skills; and which supports are needed for districts and schools to implement best practices. Because the MESH field is constantly evolving, we expect to revise our working papers periodically. Moreover, we hope educators, researchers, and policymakers will share additional research and effective practices related to MESH skill development.

If you have feedback on *Ready to Be Counted: The Research Case for Education Policy Action on Non-Cognitive Skills* or want to share your own approach to incorporating MESH in your district or school, please e-mail [press@transformingeducation.org](mailto:press@transformingeducation.org).

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## EXECUTIVE SUMMARY

A wide array of high-quality research combines to show that intrapersonal and interpersonal non-cognitive skills, such as self-control and social competence, are well-established predictors of success in academics, career, and well-being. Given the importance of these outcomes and the strength of the existing research, it is time for these competencies to be incorporated effectively into educational policy and practice as complements to existing academic and cognitive goals in order to ensure schooling works to help all students flourish.

### THE RESEARCH CASE

Multiple longitudinal and well-controlled studies have demonstrated that non-cognitive competencies in children as young as preschool age are important predictors of outcomes in their lives as adults, including high school and college completion, employability, earnings, financial stability, avoidance of criminality, and physical and mental health. In several cases, the data show these non-cognitive skills matter as much as or even more than cognitive or academic skills in predicting positive life outcomes.

This working paper maps findings from a number of these pivotal studies conducted by leading psychologists, physicians, economists, and education researchers onto a framework organized around **nine key headlines** within the domains of academics, career, and well-being. Each individual headline is supported here by several research studies. All of the findings laid out in this working paper exceed the standard tests of statistical significance rendering them worthy of publication in the scientific literature. It is also important to step back and consider that they are, in many cases, so significant as to be compelling for policymaking.

For example, in the Dunedin Multidisciplinary Health & Development Study, 95% of the young people in the top quintile of self-control went on to graduate from high school, compared with 58% for those in the lowest quintile and about 80% for those in the next two quintiles. In James Heckman's 2006 analysis of the National Longitudinal Survey of Youth from 1979 (NLSY79), non-cognitive factors were as equally predictive as cognitive factors in accounting for which young men earned a college degree by age 30. In the Fast Track longitudinal study, kindergartners with high social competency were 1.5 times more likely to graduate from high school and twice as likely to graduate from college. These are huge differences in graduation rates on the scale that education policymakers currently seek to reach, predominantly through other means and at great expense.

Among Perry Preschool Study participants, the odds of having an income over \$2,000 per month at age 27 rose fourfold—from 7% to 29%—compared to the randomized control group. The likelihood of owning a home tripled, and the frequency of having ever received welfare or similar public assistance as an adult went down by a quarter. Among the Dunedin Study cohort, those from the lowest quintile of self-control in their elementary school years were more than three times as likely as those in the highest quintile of self-control to ever have been convicted of a crime (43% versus 13%). These differences are of vast importance to the individuals involved and to society as a whole.

We have organized the headlines summarizing the literature as follows:

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## THE HEADLINES

### Academics

1. Non-cognitive skills predict high school and college completion.
2. Students with strong non-cognitive skills have greater academic achievement within K–12 schooling and college.
3. Fostering non-cognitive skills as early as preschool has both immediate and long-term impact.

### Career

1. Employers value non-cognitive skills and seek employees who have them.
2. Higher non-cognitive skills predict a greater likelihood of being employed.
3. Stronger non-cognitive skills in childhood predict higher adult earnings and greater financial stability.

### Well-Being

1. Adults with stronger non-cognitive skills are less likely to commit a crime and be incarcerated.
2. Strong non-cognitive skills decrease the likelihood of being a single or unplanned teenage parent.
3. The positive health effects associated with stronger non-cognitive skills include reduced mortality and lower rates of obesity, smoking, substance abuse, and mental health disorders.

## THE POLICY IMPLICATIONS

The goal of this working paper is to present to education policymakers the research case for the importance of non-cognitive competencies to success in academics, career, and well-being. We believe this evidence compels action. This working paper is not designed to discuss specific policy and practice options; rather, we hope to spark a dialogue on that subject and devote future working papers to the topic. But we do think a little context is needed, starting with the observation that there is already considerable, albeit uncoordinated, investment being made on the ground to develop students' non-cognitive skills.

Educators already believe strongly in the power of non-cognitive skills to help students succeed: a national teacher survey conducted in 2013 confirms that 93% of teacher respondents think it is important for schools to promote the development of non-cognitive skills and that 88% of surveyed schools already have efforts underway to help students develop these skills. Additionally, school districts are making significant direct investments in curricula and training on hundreds of programs that aim to raise non-cognitive competencies. But in the absence of clear

standards and measures, we know little about which investments are most effective in building students' skills, and approaches remain inconsistent across schools, grade levels, and even classrooms. Given this current state of the field, policy action with respect to non-cognitive competencies should focus at least as much on measuring and improving the impact of existing activities as it does on fostering more activity to build students' non-cognitive skills.

There is still much to be learned about how best to regularly measure and build non-cognitive competencies in ways that generalize across contexts and sustain over time. Nonetheless, we have evidence—summarized in the following pages—that existing non-cognitive measures are effective enough to predict outcomes forty years hence, and that interventions focused on building non-cognitive skills can impact student outcomes, often with lasting effects. Non-cognitive competencies are likely no harder to change than the literacy, math, and other skills we already invest heavily in building. In fact, many experts argue that some non-cognitive competencies are in fact more malleable than cognitive ones and for longer into adolescence.

There is ample evidence that non-cognitive competencies are critical influencers of the outcomes we all want for students: success in school, work, and life. Given this evidence, it is time for education policy and practice to focus on developing students' non-cognitive competencies alongside their academic skills. The sooner we implement coherent educational policies and practices to develop and assess non-cognitive competencies throughout K–12 schools, the sooner we will be able to focus on investing in approaches that show the most promise for building students' non-cognitive skills and helping all students reach their full human potential.



## INTRODUCTION

Parents want it for their children.

Educators believe in it and try to teach it in their classrooms.

Colleges and employers seek it among applicants.

Research confirms the importance of it for achieving success in life.

What is it? “It” refers to valuable intrapersonal and interpersonal skills, such as self-control and collaboration. For decades, psychologists, economists, and other academics have studied and established the impact of a range of these mindsets, skills, and behaviors on a wide variety of important life outcomes. They are often referred to as “non-cognitive” skills to distinguish them from the cognitive and academic skills typically seen as the province of schools. Some prefer to call them character strengths, social-emotional competencies, soft skills, 21st century skills, or other names. We prefer to call them Mindsets, Essential Skills, & Habits (MESH), and throughout this working paper we use this term interchangeably with non-cognitive skills.

In this working paper, our goal is not to define which specific non-cognitive skills matter the most, nor to debate the best terminology to label them as a group, but rather to persuade the reader that there is compelling evidence that MESH competencies are critical influencers of the outcomes we all want for students—success in academics, career, and life—and, therefore, that these skills need to be fully incorporated into education policy and practice.

What are the keys to success in school, career, and life? This profound question has been discussed and debated throughout history and is critical to any discussion about the tangible goals of schools and education systems. One interesting source for some compelling answers to the keys to long-term success arose from the natural curiosity of a New Zealand pediatrician, Patricia Buckwell, and her collaborator Phil Silva, an education psychologist. They aimed to study 1,000 children born over the 12 months starting April 1, 1973, in the small city of Dunedin, New Zealand. The researchers managed to enroll 91% of those children in their study at age 3. What started as a one-time study to answer a single medical question has flourished into one of the most valuable and productive studies of longitudinal life outcomes ever conducted: the Dunedin Multidisciplinary Health & Development Study (hereafter Dunedin Study).<sup>1</sup>

Study leaders have thoroughly examined the Dunedin Study cohort 13 times since birth, most recently capturing 95% of study members at age 38. At each interval, subjects participated in a day-long interview during which they were asked about a wide variety of matters: relationships, physical health, dental health, sexual practices, mental and emotional condition, finances, work experiences, criminal activity, and more. In addition, there are physical exams, laboratory tests, surveys, and other assessments conducted at regular intervals. The extraordinary continuity and follow-up on original study members and wide-ranging data captured have generated a mountain of valuable data leading to over 1,150 peer-reviewed research publications providing many important findings.

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<sup>1</sup> Moffitt, T. E., Arseneault, L., Belsky, D., Dickson, N., Hancox, R. J., Harrington, H., Houts, R., Poulton, R., Roberts, B. W., Ross, S.,

In 2011, the Dunedin Study team published a landmark paper, ***A Gradient of Childhood Self-Control Predicts Health, Wealth, and Public Safety***,<sup>2</sup> in Proceedings of the National Academy of Sciences (PNAS), a leading scientific journal. This paper offered one answer to the central question about the keys to success: self-control. The Dunedin Study researchers showed that a child's self-control was a powerful predictor of a wide range of important outcomes later in life, including health, financial stability, and criminal conduct. *Childhood self-control was consistently as predictive or even more predictive of these important outcomes than an individual's intelligence or the socioeconomic status of the family in which the individual was raised.*

As children, study members varied widely in their ability to delay gratification and control impulses. The researchers measured children's self-control at five points between ages 3 and 11, using reports from teachers, parents, and the children themselves, as well as observations by the researchers. The study was able to isolate the effect of self-control from potentially confounding factors. In a group of siblings in the United Kingdom reported in the same study, the authors replicated these results and could even show how differences in self-control between siblings growing up in the same family environment predicted differences in life outcomes.

We highlight a few of the key findings here as an introduction into why it is time for education policy and practice to focus on developing students' MESH competencies alongside their academic skills. As we will do throughout this working paper, we organize the Dunedin Study results into three domains: academic success, career success, and well-being.

**Academics:** Even at the first major milestone in academic attainment—completing high school—differences among Dunedin Study subjects were large. While about 95% of the top quintile in self-control earned a high school diploma, little more than half (58%) of those from the lowest quintile did so.

**Career:** Level of childhood self-control was also powerfully predictive of socioeconomic status, income, and financial stability in adulthood. For example, while 10% of the high-self-control group was categorized as “low income” (below ~\$15,000 US per year) at age 32, more than three times as many (32%) of the low-self-control group had low incomes.

**Well-being:** Children in the lowest quintile of self-control were 2.5 times more likely (27% versus 11%) to suffer from multiple health problems by their 30s. Low self-control also strongly predicted recurrent depression and substance abuse. By age 32, almost half (43%) of those in the lowest quintile of self-control had been convicted of a crime, while barely more than one in 10 (13%) of those in the top quintile were convicted criminals.

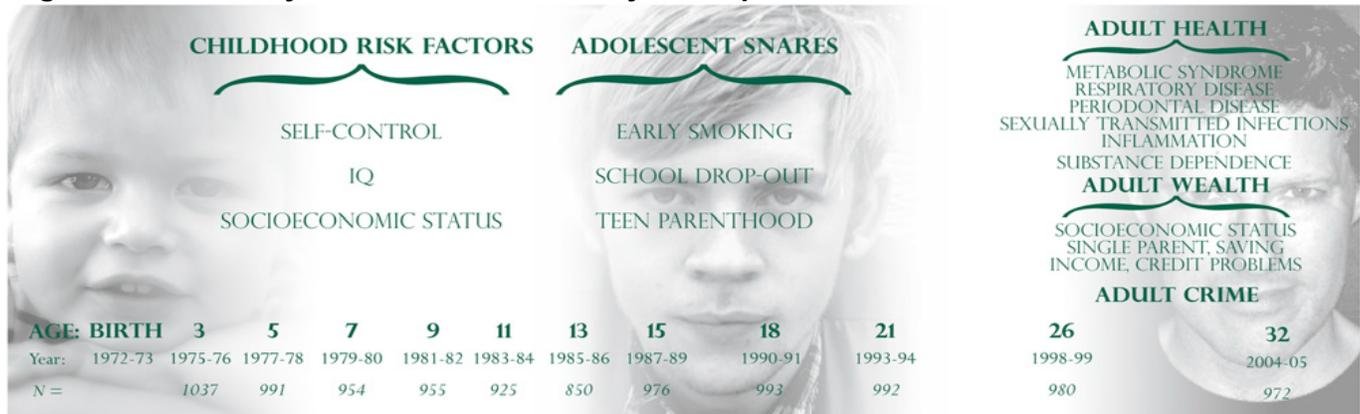
The quality and design of the Dunedin Study allows for many nuanced findings. For example, longitudinal tracking shows that children with low self-control are far more likely to fall into adolescent “snares” even before their adverse adult outcomes are visible. Those with low self-control (bottom quintile) are 2.5 times more likely to smoke by age 15, eight times more likely to drop out of high school, and four times more likely to be an unplanned parent than those with high self-control (top quintile). These adolescent obstacles helped predict longer-term outcomes; however, even among the Dunedin Study children who avoided all of these pitfalls, self-control

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<sup>2</sup> Moffitt et al., 2011

remained a statistically significant predictor of longer-term life outcomes. Similarly, among the middle three quintiles (eliminating the most and least effectively self-controlled) of Dunedin Study subjects, self-control remained statistically predictive of academic, workplace, and life outcomes. Figure 1 illustrates the life cycle of the Dunedin Study participants. It lays out study participation and measures across three phases: assessing risk factors in childhood, observing early adverse behavior in adolescence, and tracking long-term outcomes in adulthood.

**Figure 1: The Life Cycle of the Dunedin Study Participants<sup>3</sup>**



Finally, and very importantly, children’s levels of self-control were not static, and changes in individuals’ self-control levels mattered. While this was not a study of purposeful interventions, the researchers did look at the impact of changes in self-control among the Dunedin Study cohort by comparing the benefit or detriment to those whose self-control scores moved up or down meaningfully between childhood and young adulthood. These changes in level of self-control also turned out to be strongly predictive of long-term outcomes. While not *proving* that changes in self-control driven by intentional intervention (e.g., by school efforts) would be as effective, this is a very promising finding because it demonstrates that an individual’s capacity for self-control can grow meaningfully over time, leading to long-term benefits.

The Dunedin Study data and numerous other studies provide compelling evidence that the consequences of non-cognitive competencies such as self-control are far-reaching for both individuals and their children. The study authors note that “many Dunedin study members with low self-control had unplanned babies now growing up in low-income, single-parent households, [which] reveals that one generation’s low self-control disadvantages the next generation.”

<sup>3</sup> Moffitt et al., 2011

## WHAT DO WE MEAN BY “NON-COGNITIVE COMPETENCIES”?

We choose to include a wide range of specific skills under the broad rubric of non-cognitive competencies. “Non-cognitive” is an imperfect term, but it is in wide use and is helpful for differentiating this field from education’s primary focus on cognitive and academic skills and knowledge. The National Academy of Sciences produced a comprehensive 2012 study entitled *Education for Life and Work: Developing Transferable Knowledge and Skills in the 21st Century*, which organizes a great deal of scholarship and analysis under “three broad domains of competence – cognitive, intrapersonal, and interpersonal.” This fundamental division of human competencies—into cognitive and non-cognitive, and then of non-cognitive into the two broad categories of intrapersonal and interpersonal—is in wide use. This latter distinction helps make clear one central dividing line between attributes of how people manage themselves (intrapersonal) and how they interact with others (interpersonal). While those are not entirely unconnected (e.g., self-control has both intrapersonal and interpersonal components), they do seem to be naturally separate categories.

To be clear, there are many competing frameworks and terminologies covering subsets of these non-cognitive competencies. Beneath these multiple organizing schemes, many individual competencies have been named and explored by a variety of means, chiefly by psychologists. Many sound very similar and doubtless overlap with each other. For example, “conscientiousness” refers to an individual’s ability to reliably follow through, while “self-control” gets in part at the ability to avoid temptation and distraction, “grit” speaks to the ability to stick with goals over long periods, and “delay of gratification” addresses patience on the road to goals. Those all seem to overlap to a meaningful degree, and in large samples often correlate significantly; yet these competencies can also be teased apart sufficiently to merit different names and measures. Similarly, social awareness, emotional intelligence, empathy, teamwork, and cooperation are all related competencies.

The research literature on which we build this paper is based chiefly on analysis of different individual competencies. Reasonable scientists and education policymakers can and do differ on the rank order importance of any of the individual competencies, the best classification system to use among them, and the best term(s) to label them. But for the purposes of this paper—which argues the collective evidence is compelling that non-cognitive competencies should be incorporated into education policy—it is not important here to pick among the competing terminologies and frameworks. We choose to use “MESH” as our asset-based and evidence-based alternative to “non-cognitive skills” and, therefore, use those terms interchangeably in this paper. The evidence we lay out covers multiple constructs, both intrapersonal and interpersonal. What is important here is whether readers agree that some of these non-cognitive competencies have sufficiently powerful cases for being critical influencers of the outcomes we all want for students: success in academics, work, and life. If education policymakers can agree on that, then the question of which competencies matter most and the ways education policy and practice can address and advance them become critical—but are beyond the province of this paper.

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## THE APPROACH OF THIS PAPER: HEADLINES AND BUILDING BLOCKS

There is a vast literature covering various aspects of the MESH field. Given the many overlapping frameworks, such as social-emotional learning, character education, personality psychology, 21st century skills, soft skills, and so on, there are also many different methodological approaches and conventions. This working paper does not aim to be a literature review. Several such literature reviews have already been published.<sup>4</sup>

Instead, our approach organizes a selection of the most persuasive evidence as it relates to nine specific headline findings covering three consummate outcomes of education: academic success in K–12 school and college, career success and financial stability, and overall well-being. We present each of these goals separately and lay out compelling findings from across a number of studies that pertain to that specific goal. We do not present whole studies, nor do we delve into details of each study; rather, we provide a very short summary of the study and how it pertains to the specific headline. Readers who are interested may go deeper into the studies if they so choose.

We use a limited number of “building blocks” of evidence for each headline, relying predominantly on longitudinal studies that allow for significant confidence that non-cognitive competencies at a certain age turn out to predict important outcomes later on. We also cite a handful of well-controlled studies where the impact of an intervention on non-cognitive skills appears to have importantly shifted short-term and long-term outcomes. These studies demonstrate both the importance of the MESH skills and that these skills are *malleable* through interventions, giving further credence to the notion that schools can beneficially impact the development of these skills.

This research has been conducted by leading experts in their respective fields, including economists such as James Heckman and Raj Chetty; psychologists such as Walter Mischel, Carol Dweck, and Angela Duckworth; researchers at the two main college readiness assessment organizations, ACT and ETS; and other eminent academics. The fact that leading thinkers from different fields have consistently come to convergent conclusions about the impact of non-cognitive skills gives confidence in the arguments set forth here and the necessity for policy priorities in the non-cognitive skills arena.

Finally, in the sections on academic success and job success, we share the perspectives of universities and employers that measure these skills and include them in admission and hiring/promotion decisions. In those cases, we rely on arguments based on “face validity.” For example, if employers value and assess a MESH skill and include it in their decision making, it must be important for gaining and holding jobs and advancing in careers. While these arguments may be less scientific than longitudinal and randomized controlled studies, they are deeply rooted in prevailing practice.

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<sup>4</sup> For example: Borghans, L., Duckworth, A. L., Heckman, J. J., & ter Weel, B. (2008). *The economics and psychology of personality traits*. National Bureau of Economic Research, Working Paper 13810; Farrington, C. A., Roderick, M., Allensworth, E., Nagoaka, J., Keyes, T. S., Johnson, D. W., & Beechum, N. O. (2012). Teaching adolescents to become learners: The role of noncognitive factors in shaping school performance: A critical literature review. *University of Chicago Consortium on Chicago School Research online*; and Snipes, J., Fancsali, C., & Stoker, G. (2012). *Student academic mindset interventions: A review of the current landscape* (Report released by the Stupski Foundation).

## THE HEADLINES

### Academics

1. Non-cognitive skills predict high school and college completion.
2. Students with strong non-cognitive skills have greater academic achievement within K–12 schooling and college.
3. Fostering non-cognitive skills as early as preschool has both immediate and long-term impact.

### Career

1. Employers value non-cognitive skills and seek employees who have them.
2. Higher non-cognitive skills predict a greater likelihood of being employed.
3. Stronger non-cognitive skills in childhood predict higher adult earnings and greater financial stability.

### Well-Being

1. Adults with stronger non-cognitive skills are less likely to commit a crime and be incarcerated.
2. Strong non-cognitive skills decrease the likelihood of being a single or unplanned teenage parent.
3. The positive health effects associated with stronger non-cognitive skills include reduced mortality and lower rates of obesity, smoking, substance abuse, and mental health disorders.

## ACADEMICS

### 1. NON-COGNITIVE SKILLS PREDICT HIGH SCHOOL AND COLLEGE COMPLETION.

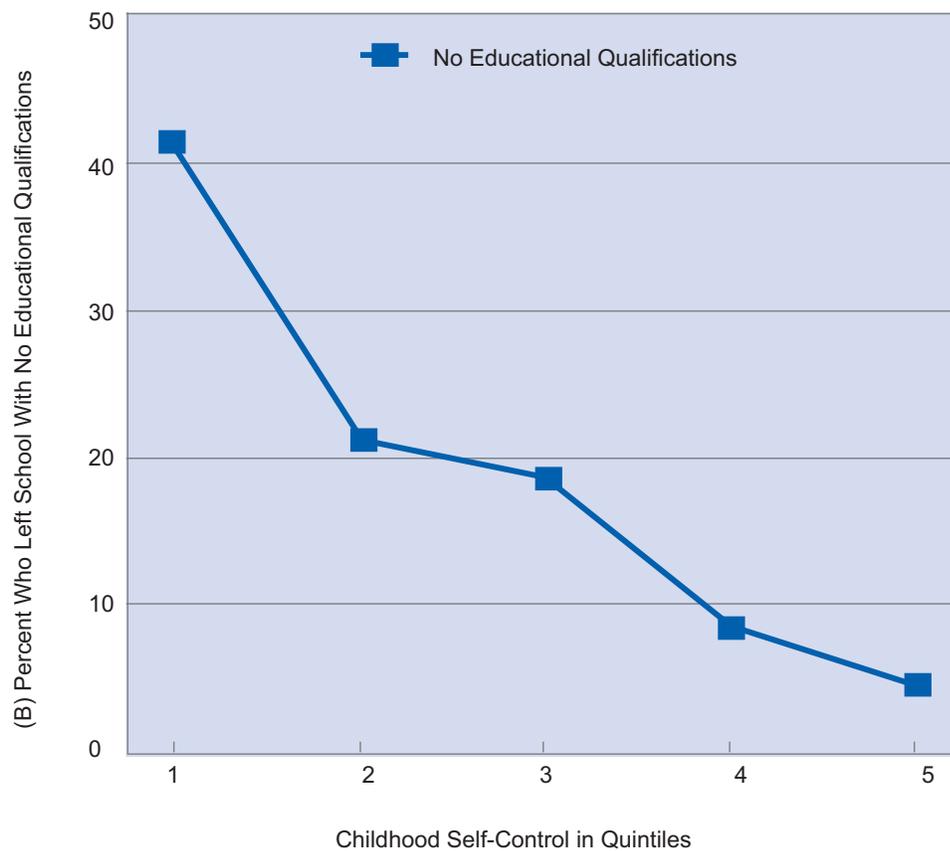
The social and economic benefits of educational attainment continue to grow, while the consequences for young people who drop out of high school can be devastating. Nonetheless, about 1.2 million students drop out of high school each year.<sup>5</sup> For those who do not complete high school, opportunities to hold a job and earn middle-class wages are vastly diminished, and the impact on the nation's economy is staggering. The Alliance for Excellent Education estimates that cutting the number of dropouts in half for a single high school class nationwide could increase the gross domestic product by as much as \$9.6 billion by the time the students reach the middle of their careers.<sup>6</sup>

<sup>5</sup> Miller, T. (July 7, 2011). Partnering for education reform (Remarks by U.S. Deputy Secretary Tony Miller at the Church of God in Christ's International AIM Convention in Houston, Texas).

<sup>6</sup> The Alliance for Excellent Education.

In the Dunedin Study, there were large differences in the rates of high school completion, and a child's self-control predicted the likelihood of that child eventually graduating from high school. As Figure 2 shows, nearly all (95%) of the children in the top quintile of self-control between the ages of 3 and 11 earned a high school diploma, compared with only about 58% of the children in the lowest quintile of self-control.<sup>7</sup>

**Figure 2: The Likelihood of Dropping Out of High School by Amount of Childhood Self-Control<sup>8</sup>**



Similarly, in a large, representative sample of German adults, the personality measure known as conscientiousness was highly statistically significantly predictive of the total number of years of schooling attained by those adults. Importantly, that correlation remained high even after controlling for measures of intelligence and, among males, was more highly correlated with attainment than was intelligence.<sup>9</sup>

Damon Jones analyzed data from the Fast Track study to assess the long-term predictive power of kindergarten teacher ratings on more than 750 students from four sites across the country. He focused specifically on the teacher assessment of students' "social competence" based on a survey asking for ratings on items such as "cooperates with peers without prompting" and "very good at understanding feelings." Nineteen years later, when the participants were about 25 years

<sup>7</sup> Moffitt et al., 2011

<sup>8</sup> Moffitt et al., 2011

<sup>9</sup> Almlund, M., Duckworth, A. L., Heckman, J., & Kautz, D. (2011). *Personality psychology and economics*. National Bureau of Economic Research, Working Paper 16822.

old, researchers were able to compare long-term outcomes across a wide variety of important dimensions and correlate these outcomes with kindergarten social competence scores, controlling for both socioeconomic status as children and early academic ability. Even after controlling for these other predictors of academic success, higher social competence in kindergarten led to a statistically significant odds ratio of 1.54 for graduating from high school and 2.00 for graduating from college.<sup>10</sup>

Through their research on 13,000 U.S. middle school students over eight years, Robert Balfanz and his colleagues identified *five key early predictors* that could identify 60% of the students who would not graduate from high school. Of their five warning flags, two were based on academic achievement (whether a student failed math or English), and the other three were based on behaviors that depended on a student's ability to self-regulate. In sixth grade, attending school less than 80% of the time, receiving an out-of-school suspension, or receiving an unsatisfactory behavior grade strongly predicted which students would not graduate from high school.<sup>11</sup> While there may be a variety of explanations for these behaviors, they are likely closely related to a student's MESH skills, particularly self-management.

Similarly, longitudinal research by Carmit Segal found eighth-grade behavior is an important indicator for long-term academic and labor market outcomes for boys. The analysis is based on data from the National Educational Longitudinal Survey (NELS). Teachers measured boys' self-management, including whether students were frequently absent or disruptive and whether they completed their homework. Segal found that boys who, by these indicators, lacked self-management skills in eighth grade were almost three times as likely to drop out of high school and almost three times less likely to graduate from college as those who had strong self-management skills.<sup>12</sup>

MESH skills are also an important predictor of earning a bachelor's degree, as Nobel laureate James Heckman and his colleagues showed using longitudinal data from the National Longitudinal Survey of Youth, 1979 (NLSY79).<sup>13</sup> In fact, a male student's non-cognitive skills are as important as his cognitive skills in predicting whether he will earn a bachelor's degree. In this research, the non-cognitive measures include the degree of control individuals feel they have over their life (locus of control) and their reported self-esteem. Figure 3 illustrates in three dimensions that the probability of a 30-year-old male having earned a college degree depended nearly equally on the levels of his cognitive and non-cognitive skills, and both dimensions were critical for success. Males in the highest decile of both types of skills reached about a 90% likelihood of earning a bachelor's degree. Neither type of skill alone is sufficient: being in the top decile of one but middling on the other left about 50% of men likely to complete college; and the likelihood of a student who had very low non-cognitive skills (first decile) earning a college degree was near zero—even if he had very strong cognitive skills (10th decile).<sup>14</sup> Interestingly, in this data set (as

<sup>10</sup> Jones, D. E., Greenberg, M., & Crowley, M. (2015). Early social-emotional functioning and public health: The relationship between kindergarten social competence and future wellness. *American Journal of Public Health* 105(11), 2283–2290.

<sup>11</sup> Balfanz, R., Herzog, L., & Mac Iver, D. J. (2007). Preventing student disengagement and keeping students on graduation path in urban middle-grades schools: Early identification and effective interventions. *Educational Psychologist* 42(2), 223–235.

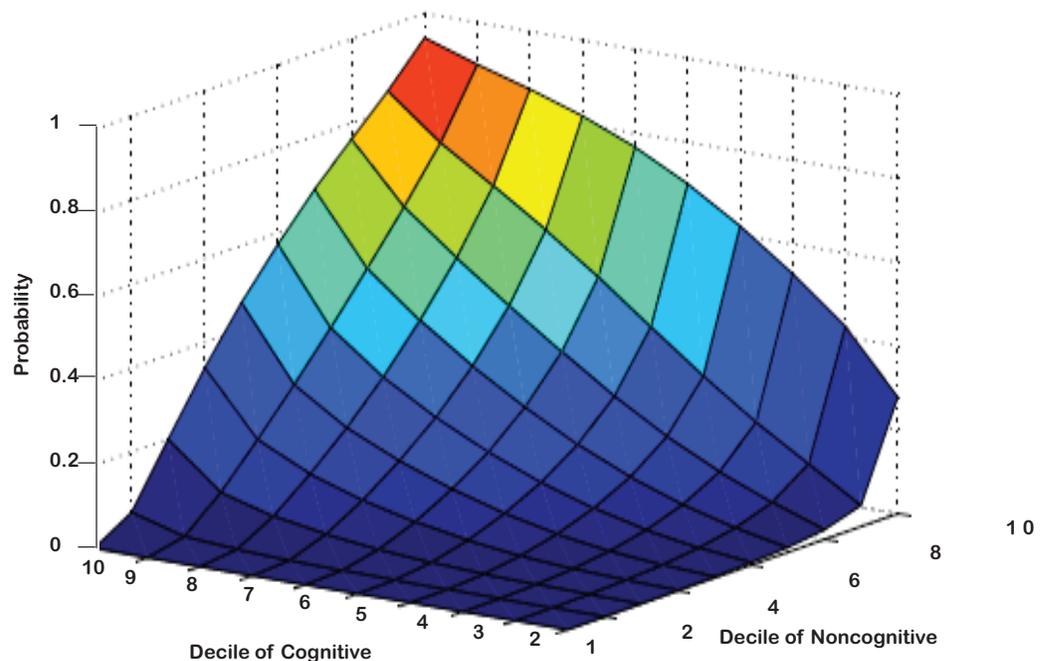
<sup>12</sup> Segal, C. (2013). Misbehavior, education, and labor market outcomes. *Journal of the European Economic Association* 11(4), 743–779.

<sup>13</sup> Heckman, J., Stixrud J., & Urzua S. (2006). The effects of cognitive and noncognitive abilities on labor market outcomes and social behavior. *Journal of Labor Economics* 24(3), 411–482.

<sup>14</sup> Heckman et al., 2006

in Segal's<sup>15</sup>), there were differences in the impact of non-cognitive skills for male and female students: the influence of non-cognitive skills for women on earning a 4-year degree was smaller than it was for men.

**Figure 3: Probability of Being a 4-Year College Graduate by Age 30 by Decile of Cognitive and Non-Cognitive Skills (Males)<sup>16</sup>**



## 2. STUDENTS WITH STRONG NON-COGNITIVE SKILLS HAVE GREATER ACADEMIC ACHIEVEMENT WITHIN K–12 SCHOOLING AND COLLEGE.

While earning a degree is certainly very important, so too is gaining knowledge and skills through the process. Angela Duckworth and Martin Seligman found self-discipline was a stronger predictor of academic success in middle school than students' IQ scores were.<sup>17</sup> In two different studies by the authors, eighth-grade students with more self-control outperformed their peers with less self-control on every academic outcome measure: they had higher grades, higher standardized test scores, higher attendance, and higher rates of admission to a competitive high school. Notably, self-control also predicted which students would improve their academic performance over the school year, while students' IQs did not.

Personality psychologists agree there are five main dimensions of human personality, which they label the Big Five: openness to experience, conscientiousness, extraversion, agreeableness, and

<sup>15</sup> Segal, 2013

<sup>16</sup> Heckman et al., 2006

<sup>17</sup> Duckworth A. L., & Seligman, M. E. P. (2005). Self-discipline outdoes IQ in predicting academic performance of adolescents. *Psychological Science* 16(12), 939–944.

neuroticism. Arthur Poropat conducted meta-analyses including tens of thousands of students correlating Big Five personality measures with grade point average (GPA) and found impressively high correlations between conscientiousness and K–12 GPA, even after controlling for intelligence. As with K–12 attainment, conscientiousness is about as highly correlated with GPA as is intelligence.<sup>18</sup>

All of this research is consistent with Walter Mischel’s classic marshmallow test that demonstrated the long-term significance of young children’s ability to delay gratification. Preschoolers who were able to delay gratification longer had higher test scores later in life. The difference between the SAT scores of children who waited the least amount of time and those who waited the longest was 210 points. In addition, those students who were able to delay gratification for longer accrued many other benefits as well, including higher levels of educational attainment.<sup>19</sup>

A meta-analysis of 213 social and emotional learning (SEL) programs by Joseph Durlak and his colleagues also found strong social-emotional skills predicted positive academic outcomes. The goals of social-emotional learning programs included developing self-awareness, self-management, social awareness, relationship skills, and responsible decision making. The authors found students who participated in the programs developed greater social-emotional skills compared to their peers in the control groups. In addition, they found improved academic outcomes, measured by both standardized tests and school grades. Students participating in SEL programs had an 11-percentile-point gain in achievement, as compared with the control groups.<sup>20</sup> These program effects also showed that these skills can be strengthened through specific interventions, demonstrating the underlying *malleability* of non-cognitive skills.

There is a growing body of research showing how students’ beliefs or “mindsets” about their intelligence predict their academic achievement both in secondary school and in college. A student’s mindset may be especially important at moments of transition, such as when starting middle school, high school, or college. The research has consistently found that students who believe they can increase their intelligence through practice and effort (i.e., students who have a “growth mindset”) fare better because they are able to face challenges more effectively than students who believe their intelligence is fixed at a certain level. Much of this research has measured the impact of specific, relatively straightforward interventions, again showing that certain MESH skills can be developed in students with research-based approaches.

Randomized controlled studies by The Stanford University Project for Education Research That Scales (PERTS) suggest even brief interventions can meaningfully affect achievement. In one study of over 1,500 high school students, students who were part of the growth mindset intervention read an article that focused on the brain’s ability to grow and the implications for students’ potential to become more intelligent and academically successful through study and practice. Then, students were asked to write about “how you can grow your intelligence with practice and better strategies” to solidify their own understanding of the topic and encourage the development of a growth mindset. Students who were guided toward a growth mindset earned

<sup>18</sup> Poropat, A. E. (2009). A meta-analysis of the five-factor model of personality and academic performance. *Psychological Bulletin* 135(2), 322–338.

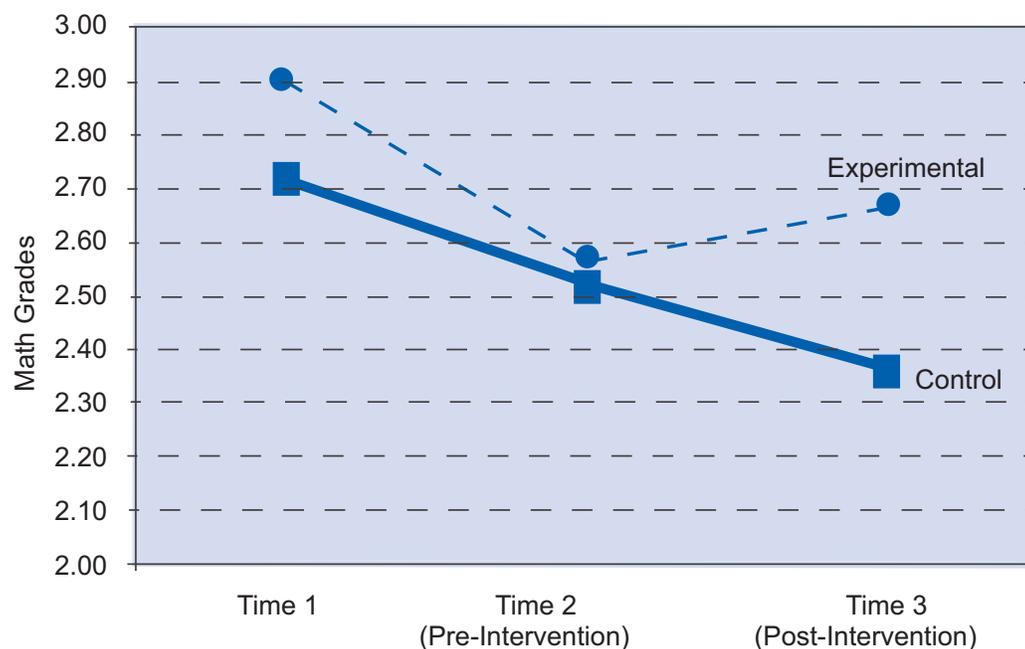
<sup>19</sup> Mischel, W. (2014). *The marshmallow test: Mastering self-control*. New York, NY: Little, Brown and Company.

<sup>20</sup> Durlak, J. A., Dymnicki, A. B., Taylor, R. D., Weissberg, R. P., & Schellinger, K. B. (2011). The impact of enhancing students’ social and emotional learning: A meta-analysis of school-based universal interventions. *Child Development* 82(1), 405–432.

satisfactory grades in courses at a 14% higher rate than students in the control group, and failed 8% fewer courses.<sup>21</sup>

Similarly, two different studies conducted by Lisa Blackwell, Carol Dweck, and colleagues examined students' beliefs about intelligence among a group of seventh-grade students in New York City. In the first study, the math grades of those seventh graders who believed that intelligence was malleable (i.e., students who had a growth mindset) increased over a 2-year period, while the grades of those who believed intelligence was fixed (i.e., students who had a fixed mindset) stayed flat.<sup>22</sup> In the second study, students who were exposed to information that aimed to foster a growth mindset subsequently improved their academic trajectory: as Figure 4 shows, students in the intervention group reversed the declining trend in their math grades after the intervention, while the grades of those in the control group continued to decline.

**Figure 4: The Effects of a Growth Mindset Intervention on Seventh-Grade Math Grades**<sup>23</sup>



Mindsets are also important for student success in college. In research by David Yeager and Greg Walton, incoming freshmen at the University of Texas were randomly assigned to receive one of four different orientation messages: 1) fostering a growth mindset, 2) combating uncertainty about belonging, 3) addressing both growth mindset and belonging uncertainty, or 4) offering a generic welcome message as a control. Previous research had shown that earning at least 12 credits in the first semester was an early indicator of on-time graduation. After the intervention, 86% of the Latino, African American, and first-generation freshmen who had received the mindset and social belonging message were on track to graduate on time, compared with only 82% of the control group. By comparison, 90% of the more advantaged students were

<sup>21</sup> Project for Education Research That Scales (PERTS). (2014). Changing mindsets to raise achievement: Evidence from the Stanford University Project for Education Research That Scales, executive summary.

<sup>22</sup> Blackwell, L. S., Trzesniewski K. H., and Dweck, C. S. (2007). Implicit theories of intelligence predict achievement across an adolescent transition: A longitudinal study and an intervention. *Child Development* 78(1), 246–263.

<sup>23</sup> Blackwell et al., 2007

on track, no matter which message they received. The intervention had an important impact, *reducing by half* the initial college success gap between disadvantaged students and their more advantaged counterparts.<sup>24</sup>

There is large-scale research showing the importance of non-cognitive skills for success in college. In a meta-analysis, Steven Robbins (then at ACT) and his colleagues examined the impact of non-cognitive skills on college grades and college persistence.<sup>25</sup> They found non-cognitive skills, particularly academic self-efficacy and achievement motivation, were significant predictors of college grades. In addition, several MESH competencies, including academic self-efficacy, helped to predict which students persisted in attending college. Additional analyses found these non-cognitive competencies had predictive power over and above that of traditional indicators—including socioeconomic status, standardized achievement, and high school grades—in forecasting college grades and persistence.

In a different ACT study—conducted by Steven Robbins and colleagues—of more than 14,000 students in 48 colleges, a non-cognitive skill the researchers called “academic discipline” predicted college grades and persistence above and beyond traditional academic predictors, such as standardized test scores.<sup>26</sup> Academic discipline reflects the amount of effort students put into their work and the degree to which they see themselves as hardworking.

In addition, Patrick Kyllonen of ETS and his colleagues have interviewed K–12 and university educators and administrators about the factors that are important to educational success. Consistently, the experts interviewed cited non-cognitive skills in their responses.<sup>27</sup> Most competitive undergraduate and graduate programs require applicants to submit materials beyond their test scores and grades to ensure admissions decisions consider a full range of cognitive and non-cognitive factors.<sup>28</sup>

Overall, there is wide agreement that success in school depends on more than a person’s academic skills. Evidence from the large-scale data sets described above aligns well with evidence from psychologists focused on growth mindset, self-control, and the ability to delay gratification: *specific non-cognitive competencies significantly predict performance and persistence in K–12 schooling and in college*. In addition, this research highlights that some of these MESH skills can be developed in students through specific interventions, putting MESH skill development within the purview of schools.

### 3. FOSTERING NON-COGNITIVE SKILLS AS EARLY AS PRESCHOOL HAS BOTH IMMEDIATE AND LONG-TERM IMPACT.

Early interventions that address self-regulation can have an immediate academic payoff. For example, a recent evaluation by Clancy Blair and Cybele Raver of the early education curricular

<sup>24</sup> Information about this research is drawn from Tough, P. (May 15, 2014). *Who gets to graduate?* *The New York Times Magazine*.

<sup>25</sup> Robbins, S. B., Lauver, K., Le, H., Davis, D., Langley, R., & Carlstrom, A. (2004). Do psychosocial and study skill factors predict college outcomes? A meta-analysis. *Psychological Bulletin* 130(2), 261–288.

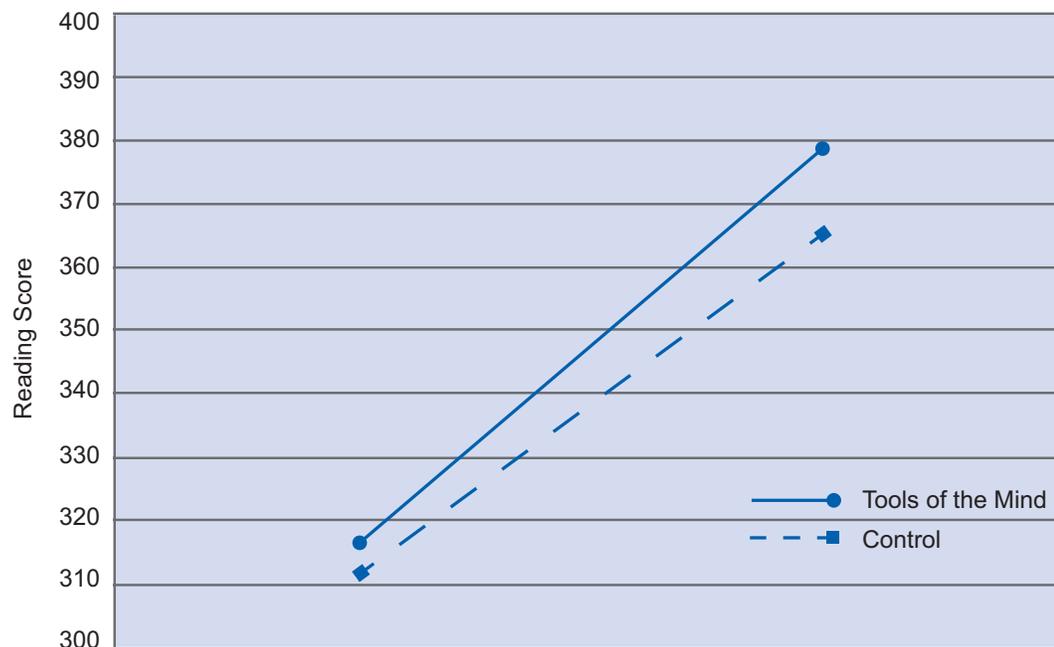
<sup>26</sup> Robbins, S. B., Allen, J., Casillas A., Peterson, C. H., & Le, H. (2006). Unraveling the differential effects of motivational and skills, social, and self-management measures from traditional predictors of college outcomes. *Journal of Educational Psychology* 98(3), 598–616.

<sup>27</sup> Kyllonen, P., Lipnevich, A., Burrus, J., & Roberts, R. (2014). *Personality, motivation, and college readiness: A prospectus for assessment and development* (ETS RR-14-06 Research Report).

<sup>28</sup> Jaschik, S. (September 13, 2010). Momentum for non-cognitive reviews. *Inside Higher Ed*.

program Tools of the Mind shows the program’s effectiveness in building executive function and self-regulation and its impact on student learning.<sup>29</sup> In this randomized control trial, students who were taught by teachers trained in the Tools of the Mind approach made greater gains in reading, vocabulary, and mathematics in kindergarten that were sustained and even expanded into first grade. Figure 5 shows the difference in reading scores between the students who participated in Tools of the Mind and those in the control group. This study also compared the effects of the program on students in high-poverty schools and students in either low- or medium-poverty schools. Some of the gains were consistent across all levels of income, while other gains, such as those in vocabulary, were specific to students in high-poverty schools. According to the researchers, these findings suggest “a focus on executive functions and associated aspects of self-regulation in early elementary education holds promise for closing the achievement gap.”

**Figure 5: Effect of the Tools of the Mind Curriculum on Growth in Reading From the Beginning of Kindergarten Through the Fall of First Grade<sup>30</sup>**



In addition, there is also research that documents long-term effects from early intervention. The findings from the famous Perry Preschool Study show long-lasting benefits from the school’s early education program.<sup>31</sup> In this 1962 intervention, low-income preschool children were randomly assigned either to the High/Scope early education program or to a control group. Although the children in the program did better on cognitive tests (e.g., IQ tests) while attending the program and for a short period afterward, their cognitive gains did not last. By third grade, the IQs of the

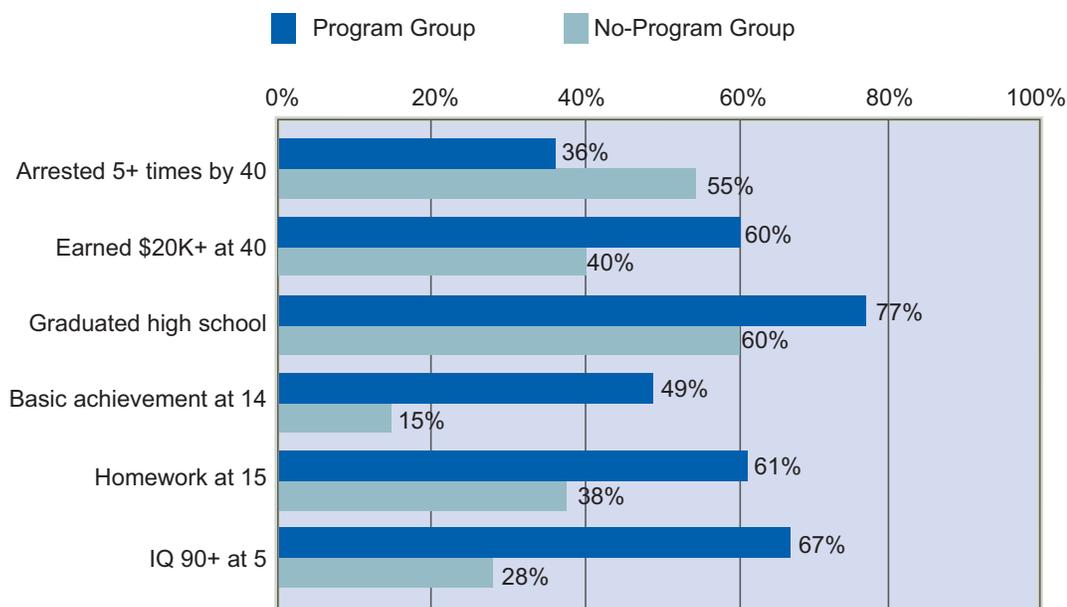
<sup>29</sup> Blair, C., & Raver, C. C. (2014). Closing the achievement gap through modification of neurocognitive and neuroendocrine function: Results from a cluster randomized controlled trial of an innovative approach to the education of children in kindergarten. *PLOS One* 9(11), 1–13.

<sup>30</sup> Blair & Raver, 2014

<sup>31</sup> Schweinhart, L. J., Montie, J., Xiang, Z., Barnett, W. S., Belfield, C. R., & Nores, M. (2005). *Lifetime effects: The HighScope Perry Preschool Study through age 40*. (Monographs of the HighScope Educational Research Foundation, 14). Ypsilanti, MI: HighScope Press.

children in the program were comparable to those of students in the control group.<sup>32</sup> At first, this finding led many to conclude the program was a failure.

**Figure 6: The Long-Term Effects of the Perry Preschool Intervention**<sup>33</sup>



When researchers analyzed long-term data, however, they found the children who participated in the preschool program had better life outcomes in a number of respects. Figure 6 illustrates that the long-term effects were wide ranging, including educational, economic, and other life outcomes. Consider that 77% of the children in the treatment group graduated from high school compared with only 60% of the control group. Program participants outperformed their peers in the control group on school achievement tests at ages 9, 10, and 14, and on literacy tests at ages 19 and 27. The preschool successfully improved the children's non-cognitive skills with lasting effects on their outcomes within and beyond school.<sup>34</sup> As part of his research, Heckman studied teacher reports that had never previously been analyzed, and he discovered that non-cognitive skills—including self-control, curiosity, and social fluidity—explained a significant amount of the benefit from the preschool.<sup>35</sup>

In line with the Perry Preschool Study, Chetty and his colleagues, through his follow-up work on the Tennessee STAR project (described in more detail in this paper under headline three of

<sup>32</sup> Around the same time, there was another randomized control longitudinal study of a preschool program called the Abecedarian Program. For this study, four cohorts of individuals born between 1972 and 1977 were randomly assigned as infants to either the early educational intervention group or the control group, and were followed through age 21. This study, in contrast to the Perry Preschool Study, found lasting cognitive effects. In addition to the cognitive gains, the program participants also had fewer childhood births outside of marriage and were more likely to attend college. Because the Abecedarian Program study did not look at non-cognitive skills as part of the research, it is not possible to determine whether these skills played a role in the program's outcomes.

<sup>33</sup> Schweinhart et al., 2005

<sup>34</sup> Schweinhart et al., 2005

<sup>35</sup> Tough, P. (2012). *How children succeed: Grit, curiosity, and hidden power of character*. New York, NY: Houghton Mifflin Harcourt Publishing Company.

Career Success),<sup>36</sup> found that non-cognitive skills developed in kindergarten have payoffs 20 years later. And Jones' analysis of the Fast Track kindergarten cohort showed important differences across many measures of academic, career, and life outcomes by age 25 depending on social competence levels as kindergartners.<sup>37</sup>

All of these studies suggest efforts to promote MESH competencies in preschool and early elementary grades can have valuable short-term and long-term impacts.

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## HIGH SCHOOL GRADES ARE A BETTER PREDICTOR OF COLLEGE COMPLETION THAN STANDARDIZED TEST SCORES BECAUSE THEY ALSO MEASURE NON-COGNITIVE SKILLS.

A growing body of research has found that high school grades are strong predictors of success in college. Most notably, in a study of 150,000 college-bound students, William Bowen and his colleagues found high school grades predicted 6-year college graduation rates two to five times more strongly than did standardized test scores.<sup>a</sup>

What is the source of difference between test scores and grades, and why are grades better predictors of college success? Standardized test scores aim to provide a highly objective measure of students' academic skills, knowledge, and aptitude through performance on identical items at a single point in time evaluated in a uniform manner using, in most cases, computerized scoring. By contrast, grades are at least somewhat subjective across teachers: they are benchmarked differently from school to school and course to course. Grades reflect a teacher's assessment of a student's performance over the whole period of the course. So how can grades be better predictors of college success than standardized tests developed largely to predict college readiness? The emerging consensus is that grades capture both cognitive and non-cognitive competencies, as teachers observe and value effort, cooperation, and other non-cognitive competencies alongside academic knowledge and skills. Teachers observe these competencies across the whole school year through daily class behavior, effort, homework completion, and other indicators. Thus, while grades may be less reliable and valid measures of academic skill or aptitude than well-developed standardized tests, they are better predictors of college completion because they measure both the academic skills and the non-cognitive skills needed to succeed in college.

<sup>a</sup> Bowen, W. G., Chingos, M. M., & McPherson, M. S. (2011). *Crossing the finish line: Completing college at America's public universities*. Princeton, NJ: Princeton University Press.

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<sup>36</sup> Chetty, R., Friedman, J. N., Hilger, N., Saez, E., Schanzenbach, D. W., & Yagan, D. (2011). How does your kindergarten classroom affect your earnings? Evidence from Project Star. *Quarterly Journal of Economics* 126(4), 1593–1660.

<sup>37</sup> Jones et al., 2015

Recent research has documented the connections among grades, standardized test scores, cognitive skills, non-cognitive skills, and college success. Angela Duckworth and her colleagues followed 1,755 high school seniors into their first year of college after measuring both cognitive skills and non-cognitive skills during high school.<sup>b</sup> Both types of skills were important for success in college, and higher grades and higher SAT scores both predicted college persistence. The non-cognitive characteristics of agency (growth mindset and locus of control) and diligence (self-control and grit) influenced high school grades, which then predicted college persistence. Diligence was a better predictor of high school grades than of SAT scores, whereas cognitive ability predicted SAT scores better than grades. The authors concluded high school grades predict college persistence because they reflect non-cognitive characteristics that are important for college success.

Camille Farrington and her colleagues at the Consortium on Chicago School Research (CCSR) are in the midst of an ongoing research project to create valid survey measures to assess students' non-cognitive skills. Approximately 20,000 students have taken the survey to date, and the researchers have found that non-cognitive skills—including positive academic mindsets, perseverance, motivation, and learning strategies—are consistently related to course grades. This remains true even after controlling for standardized test scores. In different research on predictive power, the CCSR found that ninth-grade grade point average (GPA) was a better predictor of high school graduation in Chicago than were eighth grade achievement test scores. Grades are also important indicators of workforce outcomes.<sup>c</sup> Shazia Miller's research has found that high school grades predict higher earnings for both men and women, even after controlling for sociodemographic characteristics and other variables.<sup>d</sup> This suggests the same skills that are important for success in college—as captured by high school grades—are also important for success in the workforce.

<sup>b</sup> Galla, B. M., Shulman, E. P., Plummer, B. D., D'Mello S. K., Finn, A. S., & Duckworth, A. L., (n.d.). *Cognitive and noncognitive determinants of high school grades, SAT scores, and first year college persistence: A prospective longitudinal study*. Manuscript under review.

<sup>c</sup> Farrington et al., 2012

<sup>d</sup> Miller, S. R. (1998). Shortcut: High school grades as a signal of human capital. *Educational Evaluation and Policy Analysis*, 20(4), 299–311.

## CAREER

### 1. EMPLOYERS VALUE NON-COGNITIVE SKILLS AND SEEK EMPLOYEES WHO HAVE THEM.

Employers consistently report that MESH skills, including teamwork and diligence, are among the top skills they seek in employees. As the ultimate arbiters of what matters in the workplace, employers' views about the required skills and competencies deserve close attention. For example, a 2006 Conference Board Survey of 400 employers sought to understand the readiness

of young people seeking to enter the workforce.<sup>38</sup> In this survey, employers were asked to list the qualities that are “very important” for new hires with a high school degree, a 2-year college degree, and a 4-year college degree. For all three types of employees, the top three qualities were: 1) professionalism/work ethic, 2) teamwork/collaboration, and 3) oral communications. Yet, employers report that many new employees lack these essential skills. Two other more recent surveys of employers reach similar conclusions: A 2012 survey of 225 employers by Millennial Branding found the skills employers deem “important” or “very important” are similar to those flagged by the Conference Board: communication skills, having a positive attitude, and teamwork.<sup>39</sup> A 2014 survey by Northeastern University of 500 business leaders further confirms the importance of these skills. When participants were asked to list the single most important skill for a college graduate, their top five responses were: communication skills, interpersonal skills (the ability to work in teams), adaptability, strong work ethic, and the ability to listen and learn.<sup>40</sup>

Researchers Murray Barrick and Michael Mount conducted a meta-analysis of correlations of the Big Five personality factors and job performance across nearly 25,000 employees in many different lines of work. Conscientiousness again showed a highly statistically significant correlation with various measures of job performance, including objective productivity, recommended raises and promotions, supervisor ratings, salary, and retention. These correlations were robust across a wide range of occupations associated with differing levels of education.<sup>41</sup>

Education economist David Deming has closely examined the NLSY79 longitudinal data to determine the specific value of social skills both to individuals and to the evolving economy. He found that nearly all job growth since 1980 has been in occupations demanding more social skills, since other trends such as automation have cut into jobs requiring only routine tasks and little social interaction. Occupations requiring high levels of analytical and mathematical reasoning but low levels of social interaction fared especially poorly during the same timeframe. Looking at the individuals from the NLSY79 study who have been tracked for over 30 years, Deming found that young people higher in social skills go on to earn higher wages in the current economy, even after controlling for both their cognitive skills and their intrapersonal non-cognitive skills. Social skills and cognitive skills are complementary in Deming’s results, and that complementarity has been shown to grow over time.<sup>42</sup>

## 2. NON-COGNITIVE SKILLS PREDICT A GREATER LIKELIHOOD OF BEING EMPLOYED.

While there are a number of gauges of success in the workplace, the simplest and most fundamental is being employed at all. In their work using the NLSY79 data, Heckman and his colleagues found that for many labor market outcomes, such as holding a job at age 30, levels of non-cognitive skills have an effect comparable to or greater than cognitive skills. MESH skills also

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<sup>38</sup> Casner-Lotto, J., & Benner, M. W. (2006). Are they really ready to work? Employers’ perspectives on the basic knowledge and applied knowledge of new entrants to the 21st century U.S. workforce. The Conference Board, Partnership for 21st Century Skills, Corporate Voices for Working America, and Society for Human Resource Management.

<sup>39</sup> Millennial Branding Student Employment Gap Study (2012).

<sup>40</sup> Northeastern University (2014). Topline report, telephone survey conducted February 3–9: Business elite national poll, 3rd installment of the innovation imperative polling series.

<sup>41</sup> Barrick, M. R., & Mount, M. K. (1991). The big five personality dimensions and job performance: A meta-analysis. *Personnel Psychology* 44(1), 1–26.

<sup>42</sup> Deming, D. (2015). The growing importance of social skills in the labor market. National Bureau of Economic Research, Working Paper 21473.

help predict other workforce outcomes. The probability of a person doing white-collar work increases with stronger non-cognitive skills, as does the likelihood of working more years.<sup>43</sup>

These findings are consistent with those of the Perry Preschool Study. There were significant differences in employment rates between the program participants and the control group. At age 40, 76% of the program participants were employed, compared to only 62% of the control group. For males, the differences were even larger: 70% of the program participants were employed, while only 50% of control group were. Further, the program participants were also likely to have higher incomes.<sup>44</sup>

Participants in the Fast Track study were 1.46 times more likely to be employed and 1.66 times more likely to have stable employment at age 25 for every one point they were scored higher by their teacher on the social competence scale when they were in kindergarten.<sup>45</sup>

A study of Swedish military recruits by Erik Lindqvist and Roine Vestman further illustrates the importance of MESH skills for both employment and earnings. In this research, males' non-cognitive skills were assessed during an interview with a psychologist. The non-cognitive skills that led to a high score included persistence, social skills, and emotional stability. Lindqvist and Vestman were then able to connect the men's non-cognitive and cognitive skills to labor market outcomes two decades later. They found those who went on to be unemployed or receive low earnings lacked non-cognitive skills to a greater extent than they lacked cognitive skills when compared with their higher-performing peers. They also found non-cognitive skills were most important for people with the lowest earnings: for workers at the 10th percentile of earnings, the effect of non-cognitive skills on earnings was 2.5–4 times greater than the effect of cognitive skills. One of the reasons is that men with weak non-cognitive skills were significantly more likely to become unemployed than men with weak cognitive skills. In addition, once unemployed, men who had weaker non-cognitive skills experienced longer periods of unemployment. The authors concluded "a certain level of non-cognitive ability is a prerequisite for avoiding failure in the labor market whereas cognitive ability is at least as important for achieving success."<sup>46</sup>

### **3. STRONGER NON-COGNITIVE SKILLS IN CHILDHOOD PREDICT HIGHER ADULT EARNINGS AND GREATER FINANCIAL STABILITY.**

Multiple studies included in this working paper have shown long-term earnings and financial stability benefits accruing to adults who had stronger MESH skills as children. Within the Dunedin Study, childhood self-control strongly predicted adult earnings, socioeconomic status, level of savings, and frequency of financial hardship. Figure 7 shows some of the financial indicators in the Dunedin Study as they relate to childhood levels of self-control.

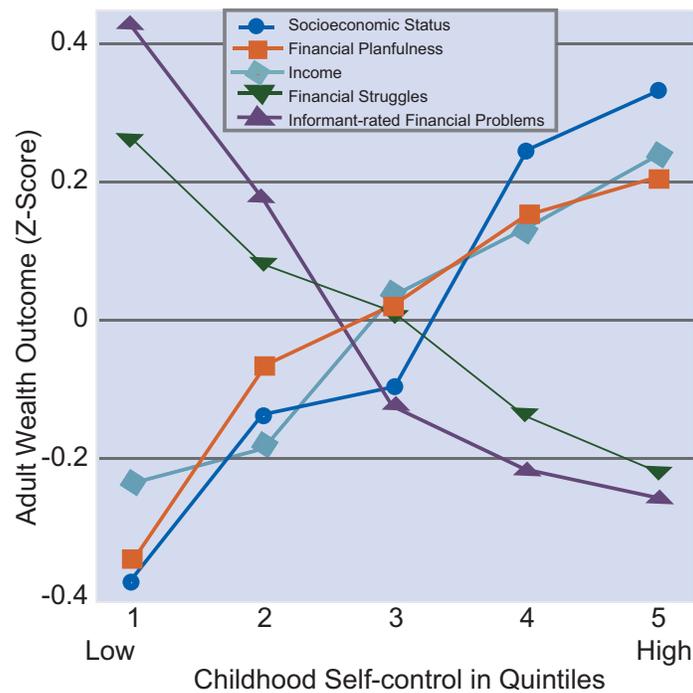
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<sup>43</sup> Heckman et al., 2006

<sup>44</sup> Schweinhart et al., 2005

<sup>45</sup> Jones et al., 2015

<sup>46</sup> Lindqvist, E., & Vestman, R. (2011). The labor market returns to cognitive and noncognitive ability: Evidence from the Swedish enlistment. *American Economic Journal: Applied Economics* 3(1), 101–128.

**Figure 7: Childhood Self-Control Predicts Adult Financial Security and Stability<sup>47</sup>**

Raj Chetty and his colleagues reached similar findings when they reanalyzed data from Project STAR, a randomized intervention involving nearly 12,000 Tennessee kindergartners in the 1980s. Although early academic gains faded out by fourth grade, the effects of the quality of kindergarten classes shone through 20 years later. Chetty and his colleagues were able to categorize the quality of kindergarten classes based on the value added to test scores. They found a high-quality kindergarten class had significant impacts on students' subsequent MESH skills—such as effort, initiative, and lack of disruptive behavior—assessed in fourth and eighth grades. The kindergarten students in the high-quality classes then fared better in life, as measured by a broad set of long-term outcomes: higher earnings and an increased likelihood of attending college, owning a home, and saving for retirement. The authors concluded, “These results suggest that high quality [kindergarten] classrooms may build non-cognitive skills that have returns in the labor market but do not improve performance on standardized tests.”<sup>48</sup>

These findings are consistent with Segal's study of eighth-grade boys.<sup>49</sup> More than a decade later, the boys who scored poorly on self-management skills in eighth grade earned, on average, 9.8% less per year than boys with strong self-management skills. And these self-management ratings were better predictors of the participants' earnings than were cognitive test scores.<sup>50</sup> Similar to the findings of Lindqvist and Vestman's research, non-cognitive skills are particularly important for those without a college degree.<sup>51</sup>

<sup>47</sup> Moffitt et al., 2011

<sup>48</sup> Chetty et al., 2011

<sup>49</sup> Segal, 2013

<sup>50</sup> The cognitive test scores predicted earnings only for students with postsecondary degrees.

<sup>51</sup> Lindqvist & Vestman, 2011

Employers seek employees who have strong non-cognitive skills. The skills and behaviors that enable success in schools—such as effort, attendance, self-management, and collaboration—are valued in the workplace as well. While the labor market values both cognitive and non-cognitive skills, people with stronger non-cognitive skills are more likely to be employed, find a job if they are unemployed, and have higher earnings and greater financial stability.

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## WELL-BEING

### 1. ADULTS WITH STRONGER NON-COGNITIVE SKILLS ARE LESS LIKELY TO COMMIT A CRIME AND BE INCARCERATED.

What makes a person more or less likely to commit a crime? One important source of evidence arises from the Dunedin Study, according to which those individuals with the lowest self-control during childhood were more likely to engage in criminal activity. Nearly half (43%) of the children in the lowest quintile of self-control had an adult criminal conviction. In contrast, about 13% of the children in the highest quintile of self-control had a criminal conviction. A second longitudinal study of children born in Christchurch, New Zealand, confirms these findings. In this second study, researchers wanted to test whether criminal activity was linked specifically to children's general self-control as opposed to diagnosable "childhood conduct problems," including aggressive and antisocial behavior. After controlling for childhood conduct problems, the researchers found there were still significant associations between childhood self-control and later violent crimes.<sup>52</sup>

The findings from the Perry Preschool Study are consistent with the Dunedin Study and Christchurch findings: children who participated in the preschool program were significantly less likely to get involved in illegal activities through age 40, compared with children in the control group. More than half of the members of the control group (55%) were arrested five times or more, compared with 36% of program participants. While only 14% of the program participants had been arrested for a drug-related crime, more than one-third (34%) of the control group had been arrested for a drug-related crime.<sup>53</sup>

Among participants in the Fast Track study that looked at kindergarten teachers' assessments of their students' social competence and then followed up on those students through age 25, the likelihoods of arrest and incarceration were nearly 40% lower for those with stronger social competence in kindergarten.<sup>54</sup>

Research based on another longitudinal data set reached similar conclusions. James Heckman and his colleagues used NLSY79 data to examine the impact of cognitive and non-cognitive skills on the probability of a man being incarcerated by age 30. Although both types of skills are important, Heckman and his colleagues found that non-cognitive abilities actually have a greater impact. Gains in non-cognitive skills decrease the probability of incarceration. By comparison, the same size gain in cognitive skills has a smaller impact on the probability of incarceration. The

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<sup>52</sup> Fergusson, D. M., Boden, J. M., & Horwood, L. J. (2013). Child self-control and adult outcomes: Results from a 30-year longitudinal study. *Journal of the American Academy of Child and Adolescent Psychiatry* 52(7), 709–717.

<sup>53</sup> Schweinhart, 2002

<sup>54</sup> Jones et al., 2015

authors concluded, “it is non-cognitive ability, not cognitive ability, that is the dominant factor in explaining different rates of participation in crime.”<sup>55</sup>

Five different longitudinal studies all reach similar conclusions: stronger non-cognitive skills decrease an individual’s likelihood of engaging in criminal activity.

## **2. STRONG NON-COGNITIVE SKILLS DECREASE THE LIKELIHOOD OF BEING A SINGLE OR UNPLANNED TEENAGE PARENT.**

Several longitudinal studies have shown that stronger non-cognitive skills decrease the likelihood of being a single or unplanned parent, which are associated with higher rates of poverty. According to the U.S. Census, in 2012, 38.8% of households headed by single women with children under 18 years old lived in poverty, compared to only 11.5% of married couples with children under 18.<sup>56</sup>

More than 20 years after the Perry Preschool Study, there were key differences between program participants and control group members in the rates of single parenting: 57% of the women who participated in the preschool program were single parents, compared to 83% of the women in the control group.<sup>57</sup> This finding is consistent with that of the Dunedin Study, where the offspring of those who had low self-control as children were more than twice as likely to be raised in a single-parent household, compared with the offspring of those who had the highest self-control as children.

Children who had low self-control were also more likely as teenagers to have an unplanned child. These findings are consistent with Heckman and his colleagues’ NLSY79 work, which found that non-cognitive abilities have a greater impact than cognitive abilities on the chances of a woman being a single parent by age 18. For young women with the highest levels of both cognitive and non-cognitive skills, the likelihood of teenage childbearing is near zero.<sup>58</sup>

Again, there are remarkably consistent findings across these three longitudinal studies. Stronger MESH skills are associated with a lower likelihood of single and teen parenthood, which are linked to enormous social and economic costs.

## **3. THE POSITIVE HEALTH EFFECTS ASSOCIATED WITH NON-COGNITIVE SKILLS INCLUDE REDUCED MORTALITY AND LOWER RATES OF OBESITY, SMOKING, SUBSTANCE ABUSE, AND MENTAL HEALTH DISORDERS.**

Brent Roberts and colleagues collated data from multiple prospective, longitudinal studies to characterize the predictive validity of three commonly discussed baseline characteristics of individuals—socioeconomic status, IQ, and personality—on important lifetime outcomes. Conscientiousness had the strongest correlation with mortality (a negative correlation, i.e., more conscientious people live longer), higher than either IQ or socioeconomic status.<sup>59</sup> Several studies

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<sup>55</sup> Heckman et al., 2006

<sup>56</sup> U.S. Census Bureau (n.d.). *Dynamics of economic well-being: Poverty 2009–2012* [data set].

<sup>57</sup> Schweinhart, 2002

<sup>58</sup> Heckman et al., 2006

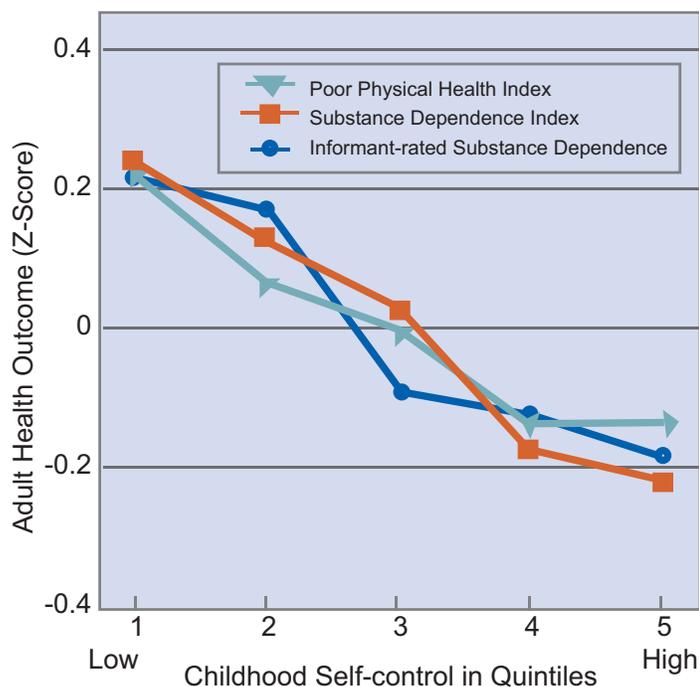
<sup>59</sup> Roberts, B. W., Kuncel, N. R., Shiner, R., Caspi, A., & Goldberg, L. R. (2007). The power of personality: The comparative validity of personality traits, socioeconomic status, and cognitive ability for predicting important life outcomes. *Perspectives on Psychological Science* 2(4), 313–345.

have replicated this strong relationship, including one study on a large group of Medicare patients. Even after adjusting for education, smoking, cardiovascular disease, and other related risk factors, one researcher found that for patients with a high-mortality disease (chronic kidney insufficiency), conscientiousness predicted longer survival—even after controlling for key disease-related measures such as hemoglobin levels and diabetes.<sup>60</sup>

The Organisation for Economic Co-operation and Development (OECD) has found that non-cognitive skills, including self-control, are more important than cognitive skills in helping to avoid obesity, one of today's greatest health risks. The OECD found that in the United Kingdom, gains in a person's non-cognitive skills from the lowest to the highest decile would decrease that person's chance of obesity by 10 percentage points. By contrast, a similar change in cognitive skills would have almost no effect on obesity.<sup>61</sup>

This finding is consistent with those of the Dunedin Study, in which researchers created a physical health index for each participant and tracked metabolic abnormalities, including obesity. The study also assessed the participants for depression and substance dependence. Children who had less self-control were more likely to experience health problems as adults, after controlling for socioeconomic status and cognitive skills. Figure 8 shows steep differences in adult health outcomes depending on a person's childhood self-control. Children with less self-control also were much more likely to have drug and alcohol problems as adults.

**Figure 8: Childhood Self-Control Predicts Health**<sup>62</sup>



<sup>60</sup> Christensen, A. J., Ehlers, S. L., Wiebe, J. S., Moran, P. J., Raichle, K., Ferneyhough, K., & Lawton, W. J. (2002). Patient personality and mortality: A 4-year prospective examination of chronic renal insufficiency. *Health Psychology* 21, 315–320.

<sup>61</sup> Organisation for Economic Co-Operation and Development (OECD). (2014). *ESP international report: Skills for social progress*.

<sup>62</sup> Moffitt et al., 2011

Among Fast Track study participants, those rated more highly on social competence in kindergarten were one-third less likely to binge drink at age 25, and almost half as likely to smoke marijuana. They were also about half as likely to have taken medication for mental health reasons.<sup>63</sup>

In another measure of health, James Heckman and his colleagues used data from the NLSY79 to analyze the impact of non-cognitive skills on the likelihood of daily smoking by age 18. They found that *gains in non-cognitive skills for males have a larger impact in decreasing the likelihood of smoking than comparable gains in cognitive skills*—although the same is not true for women, for whom cognitive skills have a bigger impact. Similarly, greater non-cognitive skills for men also decrease the probability of using marijuana, whereas cognitive skills are not a strong predictor.<sup>64</sup>

These various studies ultimately reach the same conclusion: strong non-cognitive skills predict better health outcomes throughout life.

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## CONCLUDING THOUGHTS

The cumulative evidence presented above shows that multiple non-cognitive competencies are well-established predictors of future success in academics, the workplace, and life. We are fortunate to benefit from longitudinal research that follows cohorts of children and students for decades, unveiling much about the trajectory of life outcomes linked to non-cognitive skills. Measures of some MESH competencies in children as young as preschool age show considerable impact on outcomes in their lives as adults. In several cases, the data show that these non-cognitive skills matter more than cognitive and academic ones.

All of the findings laid out in this working paper exceed the standard tests of statistical significance rendering them worthy of publication and consideration. But it is also important to step back and consider that they are, in many cases, so significant as to be compelling for policymaking. In the Dunedin Study, young people in the top quintile of self-control were 95% likely to graduate from high school, compared with 58% for those in the lowest quintile and about 80% for those in the next two quintiles.<sup>65</sup> Among Perry Preschool Study participants, 77% of students in the intervention group graduated high school, compared to 60% of students in the control group.<sup>66</sup> These are huge differences in graduation rates on the scale that education policymakers currently seek to reach, predominantly through other means and at great expense.

While MESH competencies have demonstrated impact in a wide range of areas, they are especially important in avoiding negative outcomes like involvement in crime. Perry Preschool Study participants came from deeply disadvantaged backgrounds. It is eye-opening to consider that among control group members, more than half (55%) had been arrested five or more times by age 40. But it is also heartening that one of the long-term benefits of the preschool intervention was a one-third lower rate (36%) of five or more arrests. While 28% of program participants had served time in prison, almost twice as many (52%) of the members of control group had done so.<sup>67</sup> Again, the findings are consistent with the Dunedin Study, which documented from the study

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<sup>63</sup> Jones et al., 2015

<sup>64</sup> Heckman et al., 2006

<sup>65</sup> Moffitt et al., 2011

<sup>66</sup> Schweinhart et al., 2005

<sup>67</sup> Schweinhart et al., 2005

Dunedin are consistent – a conviction rate of 43% among those with the least self-control as children, versus just 13% for those with the most.<sup>68</sup> These differences are of vast importance to the individuals involved, perpetrators and victims alike, and to society as a whole.

In the workplace, employers consistently state that they value non-cognitive skills such as “work ethic” and “teamwork” highly. It is again notable that the consequences of having low non-cognitive skills are especially salient for those who are most socioeconomically disadvantaged. In both the Lindqvist and Vestman Swedish military study<sup>69</sup> and Carmit Segal’s study of U.S. eighth graders,<sup>70</sup> non-cognitive skills showed considerably greater impact on earnings than cognitive skills for those without a college degree, largely because of chronic unemployment among those low in MESH skills.

There is much to learn about the best approaches to regularly measure and to raise non-cognitive competencies in ways that generalize across contexts and sustain over time. But we have evidence—such as the Perry Preschool Study,<sup>71</sup> the Project STAR kindergarten classroom,<sup>72</sup> the Tools of the Mind early education intervention,<sup>73</sup> the Dweck growth mindset training for middle graders,<sup>74</sup> and the Yeager and Walton college success work<sup>75</sup>—that targeted interventions at various life stages aimed at different non-cognitive competencies can change students’ skills and outcomes, often with lasting effects. Thus, while we need to do far more to identify which approaches work best and under what circumstances, non-cognitive competencies are likely no harder to change than the literacy, math, and other skills we already invest heavily in building. Many experts argue that some MESH competencies are in fact more malleable than cognitive ones, especially at later ages.<sup>76</sup> The sooner we implement coherent educational policy and practice to develop and track non-cognitive competencies in K–12 schools, the sooner we will learn which approaches show the most promise for impacting students’ MESH skills and their long-term outcomes.

It is important to note that the impact of non-cognitive competency gains may, in fact, be far longer lasting and deeper than the comparable boosts in academic skills, which are often prone to diminish over time. In the cases of the Perry Preschool<sup>77</sup> and Project STAR experiments,<sup>78</sup> it is notable that early academic gains faded away over time—a common occurrence in academic interventions. But years later, those who had received the intervention reaped large gains on important outcomes, apparently mediated by the less monitored non-cognitive competency gains resulting from the initial intervention.

Although the scope of this working paper is intentionally limited to making the case for action, it seems worth making three important observations about why it is important to define and act on responsible education policies that incorporate non-cognitive competencies now.

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<sup>68</sup> Moffitt et al., 2011

<sup>69</sup> Lindqvist & Vestman, 2011

<sup>70</sup> Segal, 2013

<sup>71</sup> Schweinhart, 2005

<sup>72</sup> Chetty et al., 2011

<sup>73</sup> Blair & Raver, 2014

<sup>74</sup> Blackwell et al., 2007

<sup>75</sup> Tough, 2014

<sup>76</sup> Almlund et al., 2011

<sup>77</sup> Schweinhart et al., 2005

<sup>78</sup> Chetty et al., 2011

First, while we have much to learn about the best ways to prioritize, measure, and strengthen these vital skills, the evidence above demonstrates that existing MESH measures are effective enough to predict outcomes 40 and more years hence. School systems have been targeting literacy for a long time and yet are still working to improve measures and pedagogy associated with this skill. Similarly, measures of MESH skills will improve with time and use. We will never finish what we do not even start.

Second, because educators believe so strongly in these non-cognitive competencies, they already devote huge quantities of scarce learning time to building these skills. Additionally, school districts are making significant direct investments in curricula and training on hundreds of programs that aim to raise MESH competencies now. But in the absence of clear standards and measures, we know little about which investments are most effective in building students' skills, and approaches remain inconsistent across schools, grade levels, and even classrooms. As such, policy action with respect to MESH should focus at least as much on evaluating the impact of existing activities as it does on fostering more activity to build students' skills.

Finally, neither this field nor our global competitors are standing still. There is a boom in new research and creative approaches to raising students' MESH competencies, and many of America's peers and competitors are moving on this front already. For example, the OECD Centre for Educational Research and Innovation is a longitudinal study to assess students' non-cognitive skill development around the world, and the 2015 Programme for International Student Assessment (PISA) exam already included a performance task aimed at measuring students' collaborative problem-solving skills.

Based on the significant and growing research base described above, there is ample evidence that MESH competencies are ready to join cognitive and academic skills as peers in the education system's quest to help all students reach their full human potential.

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## ABOUT TRANSFORMING EDUCATION

**Transforming Education** (TransformEd) advances research, policy, and practice to support students in developing the intrapersonal and interpersonal “non-cognitive” competencies they need to succeed in college, career, and life. TransformEd has coined the term “MESH” (Mindsets, Essential Skills, & Habits) to encompass the subset of non-cognitive skills that research has linked most clearly to student success and that are, therefore, of the most immediate importance to educators and education policymakers.

TransformEd’s work is grounded in compelling, longitudinal research on the importance of MESH competencies and informed by our on-the-ground experience as:

- **The Lead Strategic Advisor to the CORE Districts:**

Six school districts (serving over one million students) that have chosen to integrate MESH competencies alongside academic outcomes in their federally approved accountability and continuous improvement system; and

- **The Facilitator of the Boston Charter Research Collaborative (BCRC):**

A collaboration between six high-performing charter management organizations and researchers at Harvard University and Massachusetts Institute of Technology (MIT) to develop and pilot innovative ways to assess and develop students’ cognitive and MESH skills.

Through our relationships with the leading researchers, policymakers, and education system leaders, TransformEd is uniquely positioned to translate lessons learned from our on-the-ground research and practice work into changes in education policy that will help ensure all students have opportunities to build the MESH skills they need to succeed in school and beyond.

TransformEd operates as an autonomous program within the nonprofit National Center on Time & Learning (NCTL), which provides administrative and fiscal operational support.

Transforming Education’s national advisory board brings together many of the leading experts focused on the mindsets, skills, and habits that help children succeed. These experts include Jonas Bertling (Educational Testing Service [ETS]), Clancy Blair (New York University), Marc Brackett (Yale University), Angela Duckworth (University of Pennsylvania), Carol Dweck (Stanford University), Camille Farrington (University of Chicago), John Gabrieli (Massachusetts Institute of Technology), Hunter Gehlbach (University of California, Santa Barbara), Paul Goren (Evanston/Skokie School District), Damon Jones (Pennsylvania State University), Laura Keane (uAspire), Matthew Kraft (Brown University), Patrick Kyllonen (ETS), Rick Miller (CORE Districts), Paul Reville (Harvard University), Greg Walton (Stanford University), Roger Weissberg (Collaborative for Academic, Social, and Emotional Learning [CASEL]), Marty West (Harvard University), Daniel Willingham (University of Virginia), and David Yeager (University of Texas, Austin).

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