

What Mediates the Impact of Poverty On Academic Performance? How Social Policy Can Narrow the Achievement Gap¹

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The gaps in achievement and attainment between races and classes have long vexed our educational system, with the former remaining stubbornly stable and the latter growing in recent decades. Researchers consistently conclude that these gaps mostly form before school and during the summer as the result of a vast array of out-of-school influences, but policy has primarily aimed to change what happens inside schools. I argue that aiming instead to mitigate the effects of factors/conditions experienced outside of school may offer a better solution. I review and evaluate the evidence linking 21 different factors/conditions disproportionately experienced by those living in urban poverty with academic performance. Overall, strong evidence supports the theory that policy could alter 12 of the factors/conditions in ways that would subsequently improve the academic performance of students living in urban poverty and narrow the achievement gap. In all, 19 are supported by at least moderately strong evidence.

We know that children living in poverty perform significantly worse in school and that these differences in performances stem mostly from their experiences outside of school. But what, exactly, is it about living in poverty that harms children's academic performance? And can social policy mitigate the effects of poverty in ways that will narrow the achievement gap? To begin to answer that question, I examine the evidence that a wide range of environmental conditions and social factors experienced disproportionately by those living in poverty negatively impact academic performance. I discuss both areas that merit further exploration by researchers and areas that merit intervention by policymakers and practitioners.

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I first briefly describe some of the most frequently cited theories underpinning these relationships. I then briefly discuss the links between poverty and each of the conditions/factors in addition to the evidence and theory linking the particular condition/factor to academic performance and the ability of social policy to act on that condition/factor. I conclude by rating the strength of the overall evidence, the strength of the theory, and the degree to which these conditions/factors are policy malleable based on the rubric presented below. In total, I discuss 21 different factors/conditions.

Purpose

In the United States, children from upper-class households significantly out-perform children from lower-class households on virtually every measure of educational achievement and attainment. This gap has worried citizens and policymakers for decades and, as such, has been the focus of countless research studies and policy interventions. Despite some narrowing in the 1970's and 80's, progress toward closing the black-white achievement gap has essentially stalled out over the past 25 years, and new evidence suggests that the gap between low- and high-income students has actually grown during this time. The gravity of the problem combined with the recent lack of progress merit a re-examination of the strategies being pursued to close the achievement gap.

One of the (re-)emerging debates in education policy surrounds the efficacy of schools versus society in influencing the academic performance of children. A growing number now call for social reform outside of schools, with the goal of reducing poverty, in addition to (or even instead of) educational reform to close the achievement gap.

The debate between those who want to fix society and those who want to fix schools may never end, but a third option might exist: addressing the mediators between poverty and academic performance. In short, aiming to make poverty less harmful to kids rather than simply trying to end it or ignore it while pushing schools to do better.

The largest shortcoming of this option is that, while significant reason exists to believe that reducing the impact of poverty could improve students' performance in school, the evidence to support such a strategy is scattered across various fields and disciplines. As such, it remains unclear which social factors and environmental conditions to which children living in urban poverty are more likely to be exposed also significantly impact their academic performance – and which of these factors and conditions can be altered by non-school social policy.

To address these shortcomings, I investigate the questions raised above by examining a wide range of research literature. The aim of such an investigation is to avoid the ideological debate that arises when discussing the causes of poverty and the decisions made by those who end up living in poverty. This investigation will do so in three ways. The first is that the focus will be on children – who are too young to have made decisions that resulted in their living in poverty. The second is that the investigation will focus on experiences that are the *result* of living in poverty instead of decisions that may have led to a family living in poverty. Third, it will focus on conditions and factors that are concrete and tangible rather than abstract ideas that are subject to debate regarding whether or not they actually exist.

Ultimately, this paper strives to lay this groundwork by reviewing and synthesizing the evidence and theory that various social factors and environmental conditions mediate the relationship between poverty and educational performance. The results should inform the debate regarding the efficacy of policy directed at schools versus society, and begin to answer the question of whether and how non-school social policy can narrow the achievement gap between classes.

Scope

I argue in previous work (Bower, 2013) that the evidence that social policy can close the achievement gap is both scattered and limited. But this does not mean that relevant studies are few and far between. Indeed, studies linking poverty, environmental conditions and social factors, and academic performance – though scattered across many fields and disciplines – are quite abundant. This paper explores environmental conditions and social factors disproportionately experienced by children living in urban poverty and the links between these experiences and their academic performance. It, additionally, includes an exploration of the ways in which social policy might act on these various factors that mediate the relationship between poverty and achievement.

Social policy, generally defined, consists of education, health care, housing, welfare, social security, unemployment, family services, and sometimes aspects of the criminal justice system depending on which definition one uses (Midgley, Tracy, & Livermore, 2000). For the purposes of this paper, I limit the discussion to social policy outside of schools (which I refer to as “non-school social policy”) and divide it into three broad categories: housing and neighborhoods, health and health care, and family and home environment. I then divide each broad category into narrower factors and conditions. These factors and conditions, however, often overlap to some extent or could be split into further sub-groups – there is no perfect way to divide up the research. Additionally, it should be noted upfront that none of these factors/conditions are individually responsible for the achievement gap and changing only one of the 21 will not close the achievement gap. Educational disparities are caused by myriad factors (as evidenced below) and changing one thing will never end them.

We *do* have solid evidence of relationships between numerous factors/conditions within these three categories and the academic performance of children. Not only are social problems and academic performance correlated, but many social problems disproportionately impact poor, minority students. In that sense, there is strong reason to believe that alleviating social ills would disproportionately help those who tend to score the lowest – and, as a result, lead to a narrowing of the achievement gap.

In this paper, I provide a brief overview of the relationships that might exist within these three areas. I focus on the achievement gap between classes rather than between races. Because class and race are so tightly intertwined, causes and solutions mostly overlap. But I omit a serious examination of racism and any adverse impact it may have on achievement and attainment. Though race matters and deserves further attention, I focus on class because “race is important but socioeconomic status is the critical issue” (J. Murphy, 2009) – or, as Rothstein (2004, p. 52 cited by Murphy, p. 19) puts it “social class matters more than race” – and because, as discussed below, the achievement gap between students of different incomes seems to be growing while that between blacks and whites has held steady (Reardon, 2011).

Lastly, I focus on causes of the achievement gap in urban areas. I choose to focus on urban areas because high rates of poverty are present in these areas, the country is steadily urbanizing (U.S. Census Bureau, 2012), and because these areas have a high density of social services and corresponding research. Additionally, students eligible for free/reduced price lunch in large city districts performed somewhat worse than did eligible students in the rest of the nation’s schools (Uzzell et al., 2010). While rural students, in many cases, lag just as far behind as those in the inner-city, the causes of this deficit are somewhat disparate – and solutions are likely to be as well. As such, the role of social policy in influencing the achievement of rural youth merits a separate analysis.

The Achievement Gap

Black students, on average, score as much as one standard deviation below white students on standardized tests (Jencks & Phillips, 1998). While the authors label this the “Black-White Test Score Gap,” the consensus term soon became “achievement gap” (C. V. Meyers, 2012) which has been used more widely to refer to both the gaps in achievement between different races and ethnicities, and

between those of different classes or socioeconomic backgrounds (J. Murphy, 2009). This paper focuses on the gap between different classes.

Academic performance differs widely between students of different social classes across a long list of indicators, including (but not limited to): standardized test scores, grades, graduation rates, college entrance exams, college matriculation, college graduation, and completion of a graduate degree (C. V. Meyers, 2009).

Perhaps of greater concern is that while the Black-White test-score gap narrowed steadily during the 1970's and 80's, progress has essentially halted during the past quarter-century (see figures 1 and 2 for trends in NAEP reading and math scores over the past 40 years).

This change in trends may result from changes in families (Berends, Lucas, & Peñaloza, 2008), the re-segregation of schools (Condrón, 2009) and/or a myriad of other factors (Covay, 2010). Neal (2005) argues that we do not really know why progress stalled, but that it *is* clear that progress has stalled based on a variety of measures. He also points out that most of the narrowing during the previous two decades occurred because of gains by Blacks in the middle and at the top of the distribution while those at the bottom largely remained the same. The timing of the halt in progress corresponds roughly with the reversal of the desegregation movement of the past 40 years (Berends & Penaloza, 2010; Vigdor & Ludwig, 2008) and also with widening economic inequality between both Blacks and Whites and rich and poor (Magnuson & Waldfogel, 2008; Mayer, 2001).

[Insert Figures 1 & 2 Here]

Given the recent widening of wealth and income inequality, perhaps it should not be surprising that a new paper finds that the test-score gap between students from high- and low-income families

Figure 1: Black-White Achievement Gap on NAEP Math Tests

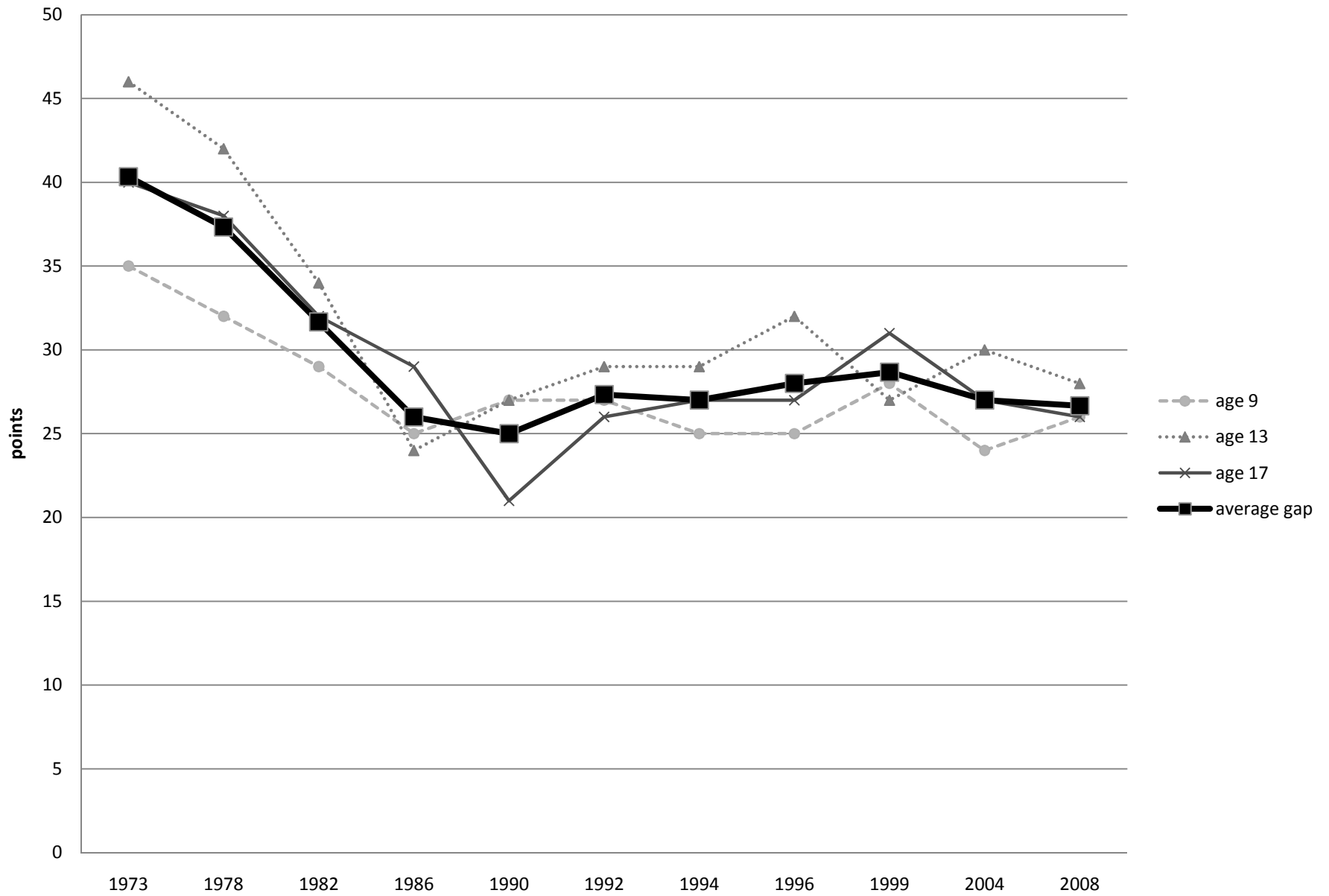


Figure 2: Black-White Achievement Gap on NAEP Reading Test



(90th vs. 10th percentile) has grown by 30-40% over the last 25 years (Reardon, 2011) and is now approximately twice as large as the black-white achievement gap (the opposite was true 50 years ago).

Regardless of the explanation, the stalling – and possibly reversal – of progress merits a re-examination of the ways in which we are attempting to narrow the achievement gap.

Causes of the Achievement Gap

While study after study finds that family income (see, for example: Blau, 1999; G. J. Duncan, Brooks-Gunn, & Klebanov, 1994; Sirin, 2005), wealth are significant predictor of academic achievement (see, for example: Orr, 2003; Shanks, 2007; Yeung & Conley, 2008), the causes of these differences are less clear.

What *is* clear, however, is that these differences in achievement are driven largely by differences outside of school. Consensus on this point has grown since the “Coleman Report” (Coleman et al., 1966) found that non-school factors are stronger predictors of the achievement of a given student than in-school factors, finding that has been replicated countless times over the past forty plus years (see, for example: Alexander, Riordan, Fennessey, & Pallas, 1982; Hauser, 1972; Sirin, 2005). The current consensus is that home background factors predict about two-thirds of achievement and school factors predict about one-third (Rothstein, 2004). Indeed, if there is anything upon which education researchers agree it is that student achievement is influenced more by non-school factors than in-school factors -- and the evidence is *overwhelming*.

Formation and growth of achievement gaps

The relative importance of non-school factors can be seen early on; at the time that students begin school, a large gap in achievement already exists (Lee & Burkam, 2002). Racial gaps are non-

existent in infants, but observable in toddlers, so the causes are almost certainly environmental rather than genetic

Not only is the achievement gap present when students begin school, it grows during summer breaks (Borman & Benson, 2010; Downey, von Hippel, & Broh, 2004; Entwisle & Alexander, 1992; Heyns, 1978). The growing gap between high- and low-SES kids during summer months eventually results in high schoolers who are more likely to be assigned to different tracks despite similar ability earlier in life and decreases the odds of low-SES students both graduating from high school and enrolling in four-year colleges (Alexander, Entwisle, & Olson, 2007).

As a result of the growth in the gap before starting school and during breaks from school, our best estimate is that about three-quarters of the gap is formed outside of school and about one-quarter is formed while students are in school (J. Murphy, 2009). This makes sense when we consider that kids spend only about 14-15% of their waking hours in schools from birth through high school³.

Methods

In order to make sense of a vast array of data, I conduct a systematic research synthesis of literature that spans numerous fields and disciplines. One challenge when conducting research syntheses is doing so in a way that is as objective and comprehensive as possible. Traditional narrative research syntheses leave readers guessing regarding the standard of evidence applied (Johnson & Eagly, 2000), and narrative syntheses relying on the author's own mental inference test can understate actual relationships found by research and paint a fuzzier picture than actually exists (Cooper & Rosenthal,

³ If a student spends 7 hours per day in school and attends 180 days of school for 13 years, they spend 16,380 total hours in school. Assuming 16 waking hours per day for 18.5 years, the average child would spend 108,114 hours awake from birth through high school. $16,380/108,114 = 15.15\%$. A more realistic estimate is probably to assume that students attend 12.5 years of school on average for 6.5 hours/day 170 days per year, but sleep 9 hours per day, which would yield an estimate of 13.97%. Some students would spend far more time in school if they sleep longer hours and attend schools with longer days/years, while others would spend far fewer hours if they sleep less, attend school less regularly, and/or drop out of school before graduating.

1980). Additionally, they often focus on only a few studies known to the author rather than an exhaustive survey of the field (G. V. Glass, 1976). When done systematically, however, a research synthesis can offer both new and accurate information about a field. Feldman (1971, p. 86) argues that “systematically reviewing and integrating . . . the literature of a field may be considered a type of research in its own right – one using a characteristic set of research techniques and methods”.

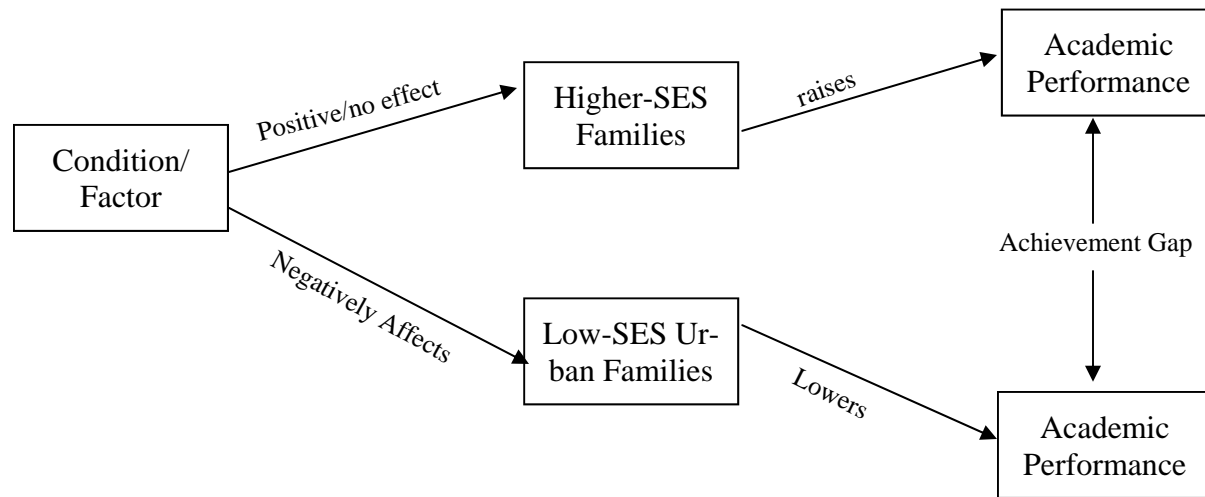
To do this, Taveggia (1974) recommends authors complete six tasks: retrieve, index, and code studies, and then accumulate comparable findings, analyze the resulting distributions, and report the results. I complete these six tasks, but under the 7-step framework proposed by Cooper (2010): (1) formulate the problem; (2) search the literature; (3) gather information from studies; (4) evaluate quality of studies; (5) analyze and integrate study outcomes; (6) interpret the evidence; and (7) present the results.

Formulating the Problem

The factors and conditions that seem to have the strongest relationship with academic performance and the greatest potential to be impacted by non-school social policy will be subject to further scrutiny based on the following theory: First, certain negative environmental conditions and social factors disproportionately affect low-income urban households, subsequently negatively impacting the academic performance of children from these households. At the same time, higher-income households are affected differently by the same conditions and factors, which raise children’s academic performance relative to other households, resulting in a gap in the achievement between children from low- and high-income households.

[Insert Figure 4 Here]

Figure 4: Conceptual map of relationship between an example social condition or environmental factor experienced disproportionately by the urban poor and the formation of an achievement gap



Second, in order for non-school social policy to reduce the achievement gap, it would first have to alter a condition or factor so that it does not negatively impact low-income households to the same extent as before. This reduction would have to subsequently increase the academic performance of children from these types of households, resulting in a smaller gap in achievement between children from low- and high-income households.

[Insert Figure 5 Here]

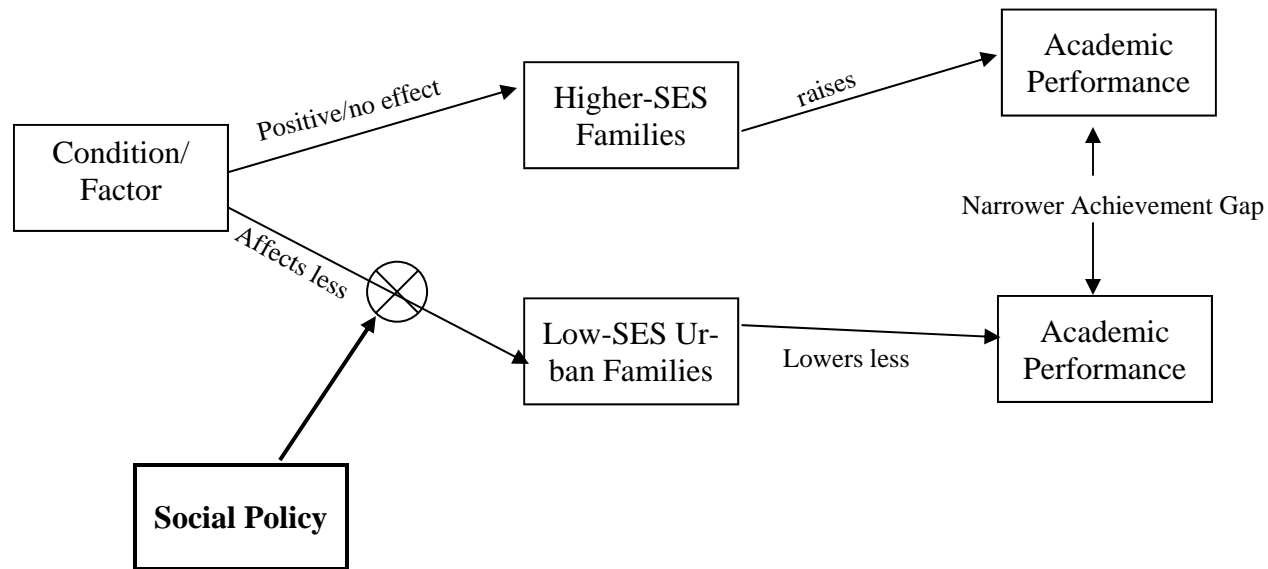
I used the following criteria to determine which factors and conditions are most likely to fit the second model:

- 1.) Disproportionately experienced by low-income, urban families
- 2.) Evidence of a non-spurious relationship
- 3.) Theoretical justification of a causal mechanism
- 4.) Policy Actionable

In short: only factors that disproportionately affect low-income, urban families can reasonably be assumed to widen the achievement gap between social classes in urban areas. Additionally, we must have strong evidence of causality in order to conclude both that a condition/factor is widening the achievement gap and that public policy may be able to act on the condition/factor in such a way so as to reduce the achievement gap. To make this conclusion, we must have theoretical evidence of a causal mechanism.

The first criterion served as a cut-off point for inclusion in the review, which discusses 21 different factors and conditions. I then use the next three criteria to assess the overall state of the evidence on each factor and also to select two factors for further scrutiny.

Figure 5: Conceptual map of how a social policy can intervene to affect a particular social condition or environmental factor experienced disproportionately by the urban poor and the formation of an achievement gap



I rate each of the 21 different factors/conditions on the first three criteria using the rubric displayed in Table 2. Each factor/condition is rated 0-3 (no evidence, weak evidence, moderately strong evidence, strong evidence) on the strength of the empirical evidence linking it with academic performance, on the strength of the theory supporting one or more causal mechanisms that would explain such a relationship, and on the ability of policy to change the factor/condition in ways that would subsequently narrow the achievement gap. Those with scores of 3 or lower across the three criteria are deemed lacking sufficient evidence to merit attention in practice or policy at the moment, those with scores between 4 and 6 are deemed moderately supported by the evidence, and those with scores of 7 or higher are deemed strongly supported by evidence.

[Insert Table 2 Here]

Searching the Literature

I define academic performance to include not only scores on standardized tests but also grades, high school graduation, and college attendance. The ultimate aim was to include the best empirical and theoretical pieces available. To do this, I limited the sample to empirical articles published in peer-reviewed journals and seminal books (published by academic presses and frequently cited in published journal articles). In order to increase the relevance of the articles included, I limited the sample to those using samples of children in the United States.

A comprehensive search of the literature was conducted to identify which social factors and environmental conditions might mediate the link between urban poverty and academic performance. The initial step was a wide variety of keyword searches in multiple research databases (Google Scholar,

Table 2: Rubric for Evaluation of Factor/Condition

		<i>Criteria</i>		
		Empirical Evidence	Theory	Policy Malleability
score	0 (None)	No evidence of a correlation between factor and academic performance	No evidence of a causal mechanism between the factor and academic performance	No evidence that past interventions have been able to alter the factor/condition or reason to believe future interventions will
	1 (Weak)	Evidence of correlation between factor and academic performance in multiple studies	A causal mechanism is proposed, but only weakly supported by other literature	Past interventions have had little to no effect and it appears difficult for future interventions to do so
	2 (Moderate)	Evidence of correlation between factor and academic performance in multiple studies that also control for possible mediating and moderating variables	Multiple studies theorize the same causal mechanism and support their theory with empirical literature	Multiple past interventions have significantly changed the factor/condition and reason exists to believe that future interventions can do better
	3 (Strong)	Evidence of strong association between factor and academic performance across many studies using varying methodologies that also control for possible mediating and moderating variables	Many rigorous studies, using varying methodologies, provide both empirical evidence of a causal mechanism and reference a wide range of supporting literature	Many rigorous studies, using varying methodologies, find practically and statistically significant effects of interventions and reason exists to believe future interventions can do better

ERIC, ProQuest). I also read through all tables of contents of the top journals in relevant fields⁴ since 2000 and downloaded relevant articles. To avoid only looking backward from the most cited articles, I used Google Scholar to see which articles had cited the articles I collected and also downloaded relevant articles from those lists. I then took these articles and a number of relevant books, read through them, chased citations as I went, and mined the bibliographies for additional citations of interest.

Additionally, over the course of four years spent reading through and compiling this literature I subscribed to table of contents alerts for the top journals in the field, Google Scholar updates for new articles in the field, and RSS feeds of blogs that list newly published articles.

In this sense, the collection of articles has never truly stopped – there will always be something newer published next week – but the search was temporarily halted in order to complete this paper at the point at which redundancy was obvious: that is, when the latest papers collected cited mostly other papers that have already been collected and little new information could be found through further searching.

Gathering Information from Studies

After collecting all relevant articles, the results of each article were coded and entered into a database containing the sample characteristics, the factor/condition being studied and how it was measured, the outcome variable and how it was measured, the direction of the relationship (positive, negative, or zero), the method used, whether the study was longitudinal or cross-sectional (and, if longitudinal, the duration of the study), whether the study was experimental, quasi-experimental, or correlational, and whether the study used primary or secondary data.

⁴ I began with the five top journals in education policy based on reputation and ISI citation index: (*Educational Evaluation and Policy Analysis, Sociology of Education, American Educational Research Journal, American Journal of Education, and Educational Researcher*), and then moved on the top journal in relevant fields/disciplines (*Child Development, Journal of Policy Analysis and Management, Urban Affairs, American Sociological Review, and American Economic Review*).

I then used these codes to sort and cluster studies as I went. The first decision was to group the studies under three umbrellas: housing/neighborhoods; health/health care; and family/home. I continuously refined sub-categories as I accumulated literature and sorted studies into 21 different groups by the factor/condition being studied. Some of these groups were straightforward (e.g. all studies on the effects of homeownership fit neatly together) while others were collections of related factors (e.g. nutrition encompasses a number of different influences on nutrition).

Evaluating the Quality of Studies

Because the sample was limited to peer-reviewed journal articles, no studies within these parameters were completely excluded from the review. Studies were given more weight, however, if they had larger samples, used more rigorous methods, were longitudinal, used primary data, and/or were more recently published.

I refrained from entirely dropping studies in part to combat this bias. Slavin (1986), for example, argues that

Reviews of social science literature will inevitably involve judgment. No set of procedural or statistical canons can make the review process immune to the reviewer's biases. What we can do, however, is to require that reviewers make their procedures explicit and open, and we can ask that reviewers say enough about the studies they review to give readers a clear idea of what the original evidence is (p. 7).

In meta-analyses that aim to find a precise quantitative estimate of effect sizes across a topic, precise judgment and weighting of quality is more of a concern than in this format. Given the limited sample, the wide-ranging nature of this synthesis, the fledgling status of many of these research fields, the unavoidable bias mentioned above, and the fact that the majority of research findings may be false (Ioannidis, 2005), I err on the side of inclusivity and transparency. I aim to provide enough objective information on the studies included in this synthesis to allow readers to judge for themselves whether or not they agree with the conclusions.

Analyzing and Integrating the Outcomes of Studies

While meta-analysis has increasingly been used to quantitatively analyze research syntheses, most factors/conditions examined in this paper fall into two of Cooper's (2010) four situations in which a meta-analysis is *not* appropriate. First, the conceptual hypotheses and measures used vary widely from study to study – authors define and measure similar outcome variables in different ways and control for different factors. Second, research is quite limited on many of these factors – for most, ten or fewer studies have been published in peer-reviewed academic journals. These make a meta-analysis possible but not appropriate.

Instead, I discuss the findings and methods of each study analyzed, display a table summarizing the studies' results, and examine both the progression of the literature over time and the differences and similarities in methods and results between studies. In this way, I provide a comprehensive analysis of what the studies say both individually and collectively.

Interpreting the Evidence

In order to interpret the collective findings of the literature, I rate each factor/condition on the rubric above. In addition to reviewing empirical results, I explore the theory behind the relationship between each item and academic performance.

In addition to the need for a theoretical causal mechanism to claim causality, the lack of research on the impact of social reform on academic performance in most areas made the theoretical reviews particularly important. The research linking factors/conditions with behaviors and traits tightly linked with academic performance, including cognitive ability (e.g. IQ), cognitive function (e.g. working memory), and effort in school receives particular attention in these theoretical reviews.

Presenting the Results

In addition to the rubric, I critically examine the strengths and weaknesses of the literature and what additional research is needed to further strengthen the literature base in each field.

Finally, I explore the literature linking non-school social policy changes to the factors/conditions most strongly linked with academic performance (based on the rubric above), this time examining research where the selected factors/conditions are the dependent variable. Since little research linking policy to academic performance exists, it is necessary to piece together the research linking social conditions and environmental factors to academic performance with the researching linking public policy to social conditions and environmental factors. The end result provides insight into the question of whether and how non-school social policy can narrow the achievement gap.

I begin with a brief discussion of various theories explaining how poverty may affect academic performance.

Theory

Neighborhood Effects

Though a wide array of social conditions influence children's academic performance, researchers and policymakers have focused more on the links between housing and neighborhoods and educational outcomes; from the Gautreaux decision to the MTO experiment and beyond. The results of this strand of policy and research have run a wide gamut. A recent review of the literature (DeLuca & Dayton, 2009) concludes that:

Housing programs have successfully helped poor parents move to safer and less disadvantaged communities and, in some cases, less segregated neighborhoods . . . Despite the ability for some of these programs to bring about context changes, it appears much more difficult to improve the educational outcomes of children. Early Gautreaux results suggested large benefits for children moving to the suburbs, but . . .

more recent MTO research concludes that neighborhood change is not enough to substantially improve schooling quality or educational outcomes.

In short, while there may be sufficient reason to believe that housing policy *can* positively and significantly impact the academic performance of some of the poorest Americans, there is as of yet no conclusive evidence that we know how to do this on a consistent basis.

One reason behind the contradicting findings for researchers and frustrating results for policymakers may be the lack of a clear consensus on a theoretical framework outlining the relationships between potential levers of housing policy and academic performance. In their introduction to the *Neighborhood Poverty* series, Gephart and Brooks-Gunn (1997) write that

Multiple theoretical perspectives, fragmented by discipline and often by method, provide partial, potentially complementary (but sometimes conflicting) guidance about the characteristics of neighborhoods that may affect the development of children, youth, and families, and about the mechanisms through which such characteristics affect families and individuals. (p. xvii)

Although the field has come a long way in the 16 years since, the problem they identify has never been fully resolved.

Why would these policies have led to changes in children's educational performance? While the theory supporting such a relationship is been well developed in some areas, it remains highly fragmented – particularly across different disciplines. In other words, while theoretical models regarding parts of the story abound, we do not yet have an all-encompassing theoretical framework. Jencks & Mayer (1990) divide theories relating neighborhoods to child development into three groups: epidemic models, collective socialization models, and institutional models. Models based on theories grouped under these umbrellas generally work as follows:

Epidemic models. Epidemic models theorize that neighborhood characteristics spread much like disease spreads – from person to person. For example, one person decides to use drugs, then

another, then another, and so on (or, perhaps, read Shakespeare). In this way, peer norms are the main driver of individual behavior; those raised in neighborhoods where going to college is the norm are more likely to attend college, and those raised in neighborhoods where dropping out of high school is the norm are more likely to drop out.

Collective socialization models. Collective socialization models hold that values are derived from adults that live in the neighborhood. Adults both serve as examples to which children should aspire and enforce rules within the neighborhood. These models would theorize that people who grow up in neighborhoods where drug dealers are idolized would be more likely to deal drugs when they come of age while those who grow up in neighborhoods full of shopkeepers would be more likely to open their own store. And people who grow up around college graduates would be more likely to attend college themselves.

Institutional Models. Institutional models underline the importance of adults from outside of the neighborhood; particularly those in positions of authority (teachers, police, etc.). Theories under this umbrella posit that children from poorer neighborhoods interact with different outside authority figures and/or are treated differently by outside authority figures. Children treated with more respect and concern by these authority figures would then stand a better chance of graduating from high school or avoiding jail.

Discussion. Theories under all these umbrellas overlap with one another and often predict similar outcomes (for example, that students in poorer neighborhoods will be less likely to graduate). Both because of that fact and because they all have empirical backing, we should consider all three when predicting and studying how social policy might impact academic performance.

That those in lower classes live in worse housing is not seriously questioned. Indeed, the local home values seem to explain differences in school-wide achievement that other background variables do not (Kane, Staiger, & Samms, 2003). This may be due in part to those with means opting to move into neighborhoods zoned for better schools, but is also likely the result of a more complicated relationship between homes and neighborhoods and various behaviors and actions. For example, it has been theorized that perception of disorder in one's surroundings leads to other negative behaviors (Franzini, Caughy, Nettles, & O'Campo, 2008; Sampson & Raudenbush, 2004). Hastings (2009) posits that neighborhood effects are compounded by a vicious cycle wherein poorer neighborhoods need more services and the situation is exacerbated when government officials fail to recognize, and subsequently act on, this condition.

Stress Theory

Based on developmental research, Shonkoff & Phillips (2000) add stress theory as a fourth group of neighborhood effects theories, but it is more often cited by health researchers. Stress Theory posits that stressors more common in poorer neighborhoods (which might range from crime to lead paint) have deleterious effects on children. These negative effects add up to create stress and inhibit development. A recent advance in the study of stress was the creation of the Adverse Childhood Experiences (ACE) survey (Felitti, 2002), which measures accumulated stress through exposure to various stressors in childhood and strongly predicts later health and academic outcomes. Stress theory would predict that children exposed to more negative experiences would be more distracted, less focused, more stressed, and lower achieving in school.

Ecological Systems Theory

Widely used by those who research both neighborhoods and family/home conditions and their effect on child development, ecological systems theory (Bronfenbrenner, 1979) and the bioecological model (Bronfenbrenner & Morris, 1998) theorize that children affected by people and institutions in five different nested levels: immediate friends, family and surroundings (the microsystem); the relationships between these immediate surroundings (the mesosystem); the outside experiences of immediate friends and family (the exosystem); the cultural context in which one lives (the macrosystem); and the historical context in which one lives (the chronosystem). Each system influences each child differently and to different extents depending on both the degree of exposure to, and context of, each.

Students who experience problems in their immediate surroundings (e.g. family conflict), relationships between these different groups (e.g. a poor relationship between their church and parents), extended social systems (e.g. a parent working in a stressful job), cultural context (e.g. high rates of poverty and unemployment), and/or historical context (e.g. racial discrimination) would be expected to perform worse in school.

Resources

Resources likely matter both directly and indirectly. In the most direct sense, more money enables families to purchase more goods to aid their children's learning. For example, a recent study using two national databases found that families who earn more money or begin earning more money spend more on physical items like books and toys in addition to enrichment activities like sports and art classes (Kaushal, Magnuson, & Waldfogel, 2011).

More indirectly, economists argue that a lack of resources diverts attention away from other tasks. For example, focusing attention on finding adequate food or water decreases the amount of attention a parent can focus on their child's physical health or the homework due the next day (Banerjee & Mullainathan, 2008).

The former predicts that a child with more stimulation at home and more activities outside the home will perform better in school because he/she had more learning experiences; the latter predicts that a child whose parents have to spend less time and energy ensuring basic needs are met will perform better in school because he/she received more attention and care.

Non-Cognitive Factors

Recent writings have focused the attention of researchers (Heckman, 2000) and the public (Tough, 2012) on the non-cognitive traits of students, with some evidence that they may be stronger predictors of school success than cognitive skills (see, for example: Duckworth & Seligman, 2005).

Some group self-control together with attention as psychological effects of poverty (Mullainathan, 2011) since the stresses encountered by those living in poverty can deplete both over time (Spears, 2011), but I instead include self-control with non-cognitive factors.

Tough lists grit, self-control, zest, social intelligence, gratitude, optimism, and curiosity as the seven factors “especially likely to predict life satisfaction and high achievement” (p. 76). Students whose environments foster development of these traits would be more likely to earn higher grades, score higher on tests, and graduate from high school and college.

Culture of Poverty

Popularized by Oscar Lewis (Lewis, 1966) and “The Moynihan Report” (Office of Policy Planning and Research, 1965), the “culture of poverty” theory essentially argued that people living in poverty had developed a destructive culture that perpetuated the cycle of poverty. Lewis later clarified (1971) that he believed that:

The people in the culture of poverty have a strong feeling of marginality, of helplessness, of dependency, of not belonging. They are like aliens in their own country, convinced that the existing institutions do not serve their interests and needs. Along

with this feeling of powerlessness is a widespread feeling of inferiority, of personal unworthiness . . . People with a culture of poverty have very little sense of history. They are a marginal people who know only their own troubles, their own local conditions, their own neighborhood, their own way of life. Usually, they have neither the knowledge, the vision nor the ideology to see the similarities between their problems and those of others like themselves else in the world (p. 21).

Lewis continues on to argue that although he believes those living in poverty had changed their culture, that these changes were not all negative. He argues, for example, that a focus on the more immediate present rather than long-term planning could lead to a more joyful and carefree life.

Though largely discredited and ignored in recent decades (Small, Harding, & Lamont, 2010), the “culture of poverty” hypothesis has made a recent comeback among scholars (P. Cohen, 2010) – but this time with a different meaning. Rather than focusing on the shortcomings of those living in poverty, the focus has shifted to examining how living in poverty affects the culture of families and neighborhoods. In this sense, Lewis may have been right that those living in poverty can feel outcast, isolated, and hopeless – but scholars now see these as an outcome rather than cause of poverty. Scholars investigating the relationship between culture and poverty would expect students who are more isolated, feel less hope for the future, and engage in less long-run planning to perform worse in school.

Summary

The theories discussed above all influence the research presented below and make appearances in a wide range of articles and topics. Indeed, researchers from different fields and disciplines often cite different theories in order to support similar arguments. Collectively, they predict that children with more stress, fewer resources, strained relationships, more chaotic surroundings, and worse role models will earn lower grades, perform worse on tests, drop out more frequently, and earn fewer degrees.

Evidence

Below, I review the evidence and theory on 21 different ways in which poverty may affect academic performance in addition to the ability of social policy to act on these factors/conditions.

Housing/Neighborhoods

That lower-income families live in both lower-quality homes and less desirable neighborhoods is not seriously questioned. A wide range of literature finds that neighborhood context matters when it comes to academic performance. The difficulty is in parsing how and why different features of neighborhoods and housing matter, why, and determining how policy can impact these features.

Determining the size and magnitude of “neighborhood effects” on academic outcomes has proven both difficult and somewhat contentious. While a correlation between neighborhood poverty and academic achievement is readily evident, disentangling the effects of the neighborhood in and of itself presents a much more difficult challenge. Aaronson (1998) argues that estimates of neighborhood effects are biased by the fact that families choose where to live. But, using data on siblings at least three years apart, he finds that moving to a neighborhood with a 10% higher poverty rate was associated with a 7% drop in the likelihood of graduating from high school. Multi-level modeling has also addressed various methodological concerns and repeatedly found empirical evidence of effects (see, for example: Garner & Raudenbush, 1991). But despite these sophisticated quantitative models, it remains unclear in exactly what ways neighborhoods influence achievement independent of other factors (Sampson, Morenoff, & Gannon-Rowley, 2002).

Another study attempted to simulate an experiment by matching similar students using longitudinal data from Chicago and found that African-American students who spent more time living in poverty had verbal achievement scores that lagged about a year behind those who spent less (Sampson, Sharkey, & Raudenbush, 2007). A somewhat similar study (Harding, 2003) used counterfactual models

to try and estimate the effects of moving to a wealthier or poorer neighborhood and found that those who moved to poorer neighborhoods less likely to complete high school and more likely to become pregnant as a teenager. While it makes intuitive sense that living in a less desirable neighborhood would negatively impact children, changing neighborhoods is no small task.

The relevant question, though, for researchers, policymakers, and practitioners is exactly what it is about poorer neighborhoods that impacts performance (and then whether/how we can change them). As Fisher (2013) puts it, “What *about* the context matters and “how does it work” (p.8). Below, I discuss the conditions and factors repeatedly highlighted in the research literature.

Disorder. While disorder may be a nebulous and subjective concept, it has been a major focus of research – particularly on crime – over the past 30 years. Much of this started as a result of “Broken Windows Theory” (Wilson & Kelling, 1982), which hypothesized that small signs of disorder (e.g. broken windows) would spread throughout neighborhoods. Police in New York City and elsewhere began cracking down on minor infractions like these in an attempt to curb crime. Crime rates fell after the advent of these policing methods, and researchers have been trying to determine causality ever since.

Links to poverty. What we do not dispute is that disorder (ranging from broken windows to chaos in the streets) makes neighborhoods less desirable and, therefore, homes there less costly. Upper and upper-middle class residents often pay huge premiums to live in gated communities, secluded developments, and/or communities with strict homeowners’ associations (Fischel, 2003) in part to avoid disorder.

Empirical evidence. Not many researchers, however, have linked disorder with academic performance. A large-scale study in Canada (Kohen, Brooks-Gunn, Leventhal, & Hertzman, 2002), though, found a negative relationship between disorder (interviewer ratings of fronts of buildings) and the verbal ability of young children.

One stumbling block in quantifying the effect of disorder on children's academic performance is that disorder is perceived differently by different people. Racial and economic context were stronger predictors of perceived disorder than objective observations by external evaluators in a study in Chicago (Sampson & Raudenbush, 2004), but poverty was a stronger predictor in a study in Baltimore (Franzini, et al., 2008).

Theory. A number of researchers have been highly critical of the theory. One large study of Chicago (Sampson & Raudenbush, 1999) argues that the relationship is spurious – after assessing social and physical disorder across the city, they find that the collective efficacy of neighbors explains both disorder and crime rates. Another study of MTO finds no evidence of direct effects of neighborhood disorder on crime (Harcourt & Ludwig, 2006).

The most compelling evidence that the relationship *is* real comes from a series of experiments conducted in the Netherlands (Keizer, Lindenberg, & Steg, 2008). The authors repeatedly found that people were at least twice as likely to ignore injunctive norms (e.g. rules against littering, trespassing, and stealing) when they witnessed disorder and other rules being broken (e.g. graffiti, illegal firecrackers, and shopping carts strewn about a grocery store parking lot).

The authors argue that seeing signs of inappropriate behavior results in people prioritizing the descriptive norm (what they perceive to be happening – in this case, something bad) over the injunctive norm (what society dictates people *should* do) and ultimately more inappropriate behavior – in line with epidemic models of neighborhood effects.

In addition to the evidence of the spreading of inappropriate behavior (which could reduce attendance and study time and worsen behavior problems in schools), separate studies have found that disorder increases stress, resulting in less sleep (Hill, Burdette, & Hale, 2009) and more child maltreatment in the home (Keyes et al., 2012), and that disorder negatively impacts community care

and vigilance (Pitner, Yu, & Brown, 2013), all of which could directly or indirectly impact academic performance.

Policy malleability. Policy can act on disorder in two broad ways. The first is attempting to reduce it in current neighborhoods by, for example, changing policing or instituting neighborhood clean-ups. “Broken Windows” policing has had mixed success in this regard (Harcourt & Ludwig, 2006). The second is by moving families to neighborhoods with less disorder or replacing whole developments with new ones that aim to be less disorderly. Programs like MTO have had mixed success attempting the former (DeLuca & Dayton, 2009) while public housing redevelopment has had mixed success attempting the latter (Curley, 2010a). Overall, disorder seems like a rather nebulous problem that likely only changes slowly over many years with concerted effort.

Summary. Despite the measurement difficulty, mixed empirical evidence on crime, and sparse evidence on educational outcomes, there is a strong theoretical basis to believe disorder may impact academic performance. We have both evidence and reason to believe that policy can change disorder, but it is unlikely to be a quick fix. Overall, I rate disorder thusly:

Empirical Evidence: 1

Theory: 3

Policy Malleability: 1

Total: 5

Recommendations for research, policy, and practice. “Disorder” means different things to different people – spanning physical and social conditions – but more chaos may stress families, lower expectations, and increase crime; all of which can negatively impact performance in school; all of which means that researchers should devote more attention the potential impacts of disorder on academic performance. Until we have stronger evidence, though, practitioners and policymakers should probably prioritize other factors/conditions when they have limited resources.

Violence and crime. Closely related to disorder are measures of crime and violence. Indeed, much of the research on disorder uses crime or violence as the outcome variable. Perhaps because crime is easier to objectively measure than disorder, there is also more research on its effects.

Links to poverty. A study of inner-city children found that the majority had been exposed to crime and violence and that higher exposure to violence was associated with more anxiety, lower grades, and more school absences (Hurt, Malmud, Brodsky, & Giannetta, 2001).

Empirical evidence. Another study in Maryland found that 3rd-5th grade students who lived in neighborhoods measured as more violent and rated by kids as less safe scored significantly lower on state math and reading tests (Milam, Furr-Holden, & Leaf, 2010). A study in Chicago found that African-American children living in the same neighborhood as a recent homicide scored at least half of a standard deviation lower on vocabulary and reading assessments within a week of the event (Sharkey, 2010). And a recent study of African-American males in high school used structural equation modeling to conclude that exposure to violence reduced feelings of safety, perceived parental support, and school involvement, which reduced self-esteem, hours spent studying, and grades (Patton, Woolley, & Hong, 2012). The consistent findings of different researchers using different methods in different locations strongly indicate that this relationship is not spurious.

Theory. Different researchers have found evidence of many different – though related – pathways through which crime and violence could affect academic performance. Various studies have found that individuals living in neighborhoods with high rates of crime and disorder are less trusting and feel more powerless (Ross, Mirowsky, & Pribesh, 2001); report more stress, leading to more depression, anger, hostility, mood changes, and lower self-esteem (Ewart & Suchday, 2002); exhibit more behavior problems (Thompson & Massat, 2005); are more likely to experience PTSD (Goldmann et al., 2011); and that children who feel less safe in their communities are more likely to be obese (D. Duncan, Johnson,

Molnar, & Azrael, 2009). And another study of children in Chicago recently exposed to homicide in their community found that they exhibited shortened attention spans and less impulse control – and that their parents experienced more acute distress – within a week of the murder (Sharkey, Tirado-Strayer, Papachristos, & Raver, 2012). The literature presents multiple plausible pathways through which crime and violence could affect academic performance. Disentangling exposure to violence, correlates of violence, psychological results of violence, and mediators of the effects of violence, however, is complicated (Foster & Brooks-Gunn, 2009), and crime and violence certainly affect different students and neighborhoods differently.

Policy malleability. Given that all of the above research focuses particularly on impoverished urban neighborhoods, it seems particularly likely that effects are felt most acutely in these areas. Crime rates have fallen considerably in these areas over the past 20 years, though likely for myriad reasons (see, for example: Dietrich, Douglas, Succop, Berger, & Bornschein, 2001; Nevin, 2007). Reducing crime and violence is certainly feasible, if often difficult.

Summary. Though the main effects are likely indirect (exposure to crime and violence appear to be mediated largely by stress manifested in various forms), and research linking them to academic performance is somewhat limited, the evidence is nonetheless fairly compelling that crime and violence likely negatively impact the performance of children in schools. Overall, I rate the research thusly:

Evidence: 2

Theory: 3

Policy Malleability: 2

Total: 7

Recommendations for research, policy, and practice. Researchers still need more longitudinal evidence on the before-and-after effects of exposure to crime and violence, but the overall evidence and theory is more than strong enough to merit attention from policymakers and practitioners.

Crime/violence reduction strategies should focus on many different causes of crime (e.g. poverty, environmental toxins, social networks, etc.) in many different ways and researchers should continue to learn about which types of interventions, policing, and consequences work best in which situations.

Social organization of neighborhoods. Much of the research on crime, violence, and disorder – particularly as they relate to the development and academic performance of children – also links the three to the social organization of neighborhoods. Indeed, a wide range of research finds that the social organization of neighborhoods – measured in various ways – influences crime rates. We can generally divide this research into studies on neighborhood social conditions, social networks, peers, and role models.

Links to poverty. As with the sections above, neighborhoods that are more chaotic and have looser ties between neighbors are likely less appealing to prospective homeowners, leading to income gaps in these characteristics. But, as I discuss below, these traits also lead worsen neighborhood conditions in many ways that would drive down property prices in a neighborhood.

Empirical evidence. The field really began when a seminal study concluded that students in Catholic high schools had tighter bonds with their peers and the community – more “social capital” – and were less likely to drop out as a result (Coleman, 1988). More recently, a team of researchers found that neighborhood-level social capital in three Midwestern cities was positively associated with school-level achievement (Woolley et al., 2008). For whatever reason, researchers have focused more on criminal and developmental outcomes of the social organizations of neighborhoods – and difficulty in measuring social capital also limits the amount of research in the field.

Theory. In terms of neighborhood conditions, “community social disorganization” (including more mobility and family disruption) increased crime in Great Britain (Sampson & Groves, 1989) and child maltreatment in the United States (Coulton, Korbin, Su, & Chow, 1995) neighborhood-level “social

control of children” reduced adolescent delinquency in Chicago (Sampson, 1997), and “social disorder” predicted more violent offenses in low-income, African-American neighborhoods (Pitner, et al., 2013). In terms of social networks, researchers have found that “collective efficacy” (cohesion among, and willingness to intervene of, neighbors) reduced violence in Chicago (Sampson, Raudenbush, & Earls, 1997).

The large amount of research on other outcomes of the social organization of a neighborhood, however, offers numerous pathways through which it may influence academic performance. Epidemiologists know that the social environment can affect the spread of disease and risk factors (Yen & Syme, 1999) and collective efficacy seems to have reduced mortality in Chicago neighborhoods during hot summer months (Browning, Feinberg, Wallace, & Cagney, 2006). In addition to increasing crime, social disorder in a neighborhood may decrease community care and vigilance (Pitner, et al., 2013). In general, tighter and more structured relations between members of a community may help the community keep watch over its children; reduce the disorder, crime, and violence to which children are exposed; foster stronger relationships; and reduce stress and health problems. All of these could reasonably be expected to impact the performance of local students in school.

At the same time, tight social bonds can foster illicit behavior as well – which is where peers and role models can come into play. Various studies, for example, have found social capital spurred organized crime (Browning, Feinberg, & Dietz, 2004) and fostered “downward-leveling social norms” (Stanton-Salazar & Dornbusch, 1995). The myriad outcomes speak to the influence of the social organization of neighborhoods, but also offer a caution that close relations alone are not enough.

Policy malleability. Changing relations between neighbors and organizational characteristics of a neighborhood is awfully difficult from a distance. While individual civic organizations, community centers, churches, and the like may have success, federal and state-level policies should not be expected to dramatically improve the social organization of individual neighborhoods.

Summary. While researchers have increased their focus on the social organization of neighborhoods recently, few articles have examined how this affects academic performance. There is strong theoretical backing behind changing these factors, but doing so will likely prove difficult. Overall, I rate social organization of neighborhoods thusly:

Empirical Evidence: 1

Theory: 3

Policy Malleability: 1

Total: 5

Implications for research, policy, and practice. In theory, the social organization of a neighborhood may have large effects. In practice, the concept is so nebulous and research so sparse that it remains difficult to reach firm conclusions. As such, the topic deserves further scrutiny by researchers but policymakers and practitioners should probably focus limited resources elsewhere while keeping a watchful eye out for the effects of interventions on social ties.

Physical conditions. The fourth, and final, factor intertwined with disorder, crime, violence, and social organization are the physical conditions of a neighborhood and its housing. The relationships between these four are fairly well-established, though sometimes lacking in detail and clarity.

Links to poverty. Much the same as those previously discussed, the physical condition of housing and other buildings depresses home prices in a neighborhood, leading to neighborhoods stratified by income and physical condition. Additionally, lower-income residents are less able to pay to fix problems, more likely to rent (leaving responsibility to the landlord), and live in neighborhoods with less local tax revenue, all of which combine to reduce spending on physical maintenance of buildings.

Empirical evidence. One study found that parental perceptions of neighborhood distress (e.g. abandoned/run-down buildings, crime, and violence) predicted school problems of their adolescent

children (S. A. Meyers & Miller, 2004). Another found that residence in better quality neighborhoods (again, using abandoned/run-down buildings, crime, and violence in addition to the degree people cared about what happened in the neighborhood) predicted reading achievement, but not math achievement, of Latino students (Eamon, 2005). And a third found that poor physical conditions reduced achievement progressively more as students moved from 1st to 8th grade (Woolley, et al., 2008). Together, these studies offer a wide range of evidence that any number of physical conditions likely matter, but little indication as to which ones matter most.

Theory. Theories behind these relationships tend to focus on stress. One study found that neighborhood deterioration predicted stress, depressive symptoms, and well-being because better conditions increased social contact and social capital while reducing fear of crime (Kruger, Reischl, & Gee, 2007). As previously discussed, another theory is that more problems and fewer resources may distract parents and reduce both productivity and the degree they can care for their child (Banerjee & Mullainathan, 2008). Physically deteriorated houses may also expose children to contaminants, increasing asthma and other health problems (Rosenbaum, 2008). In a different vein, a neighborhood's physical condition may influence the way that Principals and teachers interact with local communities (Cohen-Vogel, Goldring, & Smrekar, 2010). And a forthcoming study using longitudinal data finds that poor housing quality is associated with poorer emotional and behavioral functioning and cognitive skills (Coley, Leventhal, Lynch, & Kull, in press). The broad range of outcomes associated with physical conditions could indicate that they systemically affect multiple areas of people's lives or just that the research is scattered and has not yet reached a consensus.

One limitation of the research is that different people perceive the same social and physical environments differently. One study found, for example, that White residents perceived the same conditions as worse than Black and Hispanic residents (Schulz et al., 2008). Another is that the category

is broad and includes a myriad of factors that affect children’s lives in varying ways and to varying degrees.

Policy malleability. Changing the physical conditions of neighborhoods is conceptually straightforward: renovate and repair buildings, streets, parks, etc. Only money and a dash of political will are needed to complete such projects. Repairing and renovating privately owned homes, though, offers more challenges. Excepting government buyback of homes, policies will need to act indirectly – subsidies, incentives, fines, and so on.

Summary. Similar to many of the above factors, the research is somewhat limited regarding the effects of neighborhood/housing physical conditions on academic performance. Despite the breadth of the category and the limited research, both the empirical and theoretical evidence offer fairly compelling reason to believe that, at the very least, some aspects of the physical condition of the built environment indirectly affect academic performance. And the policy avenues to change are fairly straightforward, though large-scale fixes are costly and wholesale changes of privately owned property will likely take years. Overall, I rate physical conditions thusly:

Empirical Evidence: 2

Theory: 2

Policy Malleability: 2

Total: 6

Recommendations for research, policy, and practice. Researchers should continue to work toward a consensus regarding exactly which conditions affect people in which ways, and until that point policymakers and practitioners should probably consider most physical conditions as a secondary objective.

Public housing. When the average citizen thinks of dilapidated housing and neighborhoods with high rates of disorder, crime, and violence and low social cohesion, public housing likely comes to mind. The empirical evidence, however, is not as clear as public stereotypes.

Links to poverty. Though many public housing developments were initially aimed at middle-class residents, most serve low-income residents almost exclusively.

Empirical evidence. Currie & Yelowitz (2000) use an instrumental variables approach to cast some doubt that these developments actually harm children's achievement. Since public housing rules grant separate bedrooms to opposite sex children, families with two boys or two girls were placed in a two bedroom apartment while families with one boy and one girl would be placed in a three bedroom apartment – making the latter more likely to seek residence in a public housing development. The authors exploit this exogenous difference to compare two-child families with same- and mixed-gendered pairs of children and find that families living in public housing reside in less crowded apartments and are less likely to live in large, dense, developments and, perhaps as a result, are 11% less likely to have been held back in school based on child's age and reported school level. On the other hand, cities with more large, dense developments may influence academic performance differently; a research report from New York City (Furman Center & Institute for Education and Social Policy, 2008) found students living in public housing perform noticeably worse on standardized tests than do other students even when controlling for other background variables.

Theory. Many expect that residing in public housing would harm academic performance if the development is crime-riddled, dilapidated, and chaotic. But most developments do not fit these stereotypes.

Policy malleability. Much like physical conditions, moving residents out of public housing is conceptually straightforward – simply bulldoze and current units and lease the land to private

developers. In reality, though, this not only presents ethical, financial, and political problems but may result in residents moving to lower-quality housing and/or neighborhoods in which they do worse.

Summary. The stock of public housing, of course, varies widely across the nation – as, most likely, does the experience of the residents who live there. As a result, the sparse evidence that exists indicates that public housing itself is likely not among the main reasons that low-income children perform poorly in school. Overall, I rate public housing thusly:

Empirical Evidence: 0

Theory: 1

Policy Malleability: 2

Total: 3

Recommendations and implications for research, policy, and practice. Researchers should continue to work on isolating the aspects of public housing that influence academic performance (which likely include many of the factors/conditions explored in this paper). Until that point, policymakers and practitioners should probably focus more on community and housing conditions than whether housing is public or privately managed.

Crowding. Another factor closely associated with dilapidated neighborhoods is crowding – both within neighborhoods and within homes.

Links to poverty. Given that Americans tend to value personal space, those with fewer resources can afford to purchase less of it and end up living in closer physical proximity to both other household members and neighbors. As a result, low-income families are many times more likely to live in crowded homes (more than 1 person per room) and have less space adjacent to their homes and park space available for their use (Evans & Kantrowitz, 2002).

Empirical evidence. A re-analysis of the Kansas Language Acquisition data found that parents in more crowded homes were less verbally responsive to their children and that children’s vocabularies grew more slowly as a result (Evans, Maxwell, & Hart, 1999). Another study found that home crowding negatively affected academic performance and classroom crowding impacted both academic performance and classroom behavior (Maxwell, 2003). While both studies are compelling, a broader base of evidence is needed.

Theory. We do, however, have some good reasons to believe that a causal mechanism exists. One study found that crowding leads to unwanted social interaction, which causes psychological distress and harsher parenting techniques (Baum & Paulus, 1987). A recent review of research on housing found considerable evidence that crowding impacted children’s health (Leventhal & Newman, 2010) while research in India found that residential crowding not only decreased achievement, but increased both blood pressure and parent-child conflicts (Evans, Lepore, Shejwal, & Palsane, 1998). And a forthcoming paper finds that fewer bedrooms per child in the family home during childhood increases the degree to which adults are prone to inflammation – a major marker of disease risk – later in life (Carroll, Cohen, & Marsland, in press). These indicate that crowding may be a significant source of stress and affect both mood and physical health as a result.

Policy malleability. Crowding may be particularly hard to combat at that macro level (since it would require a considerable increase in built housing) – though a recent study did find that housing voucher recipients moved to less crowded homes (Lindberg et al., 2010).

Summary. The research base on crowding is even less well-developed than those on other related factors. The empirical evidence is extremely limited, though the theory is more developed with the most likely pathway being that crowding impacts students through increased stress and decreased health – though it may also affect social relationships. Overall, I rate crowding thusly:

Empirical Evidence: 1

Theory: 2

Policy Malleability: 1

Total: 4

Recommendations for research, policy, and practice. Overall, it seems likely that crowding contributes to the achievement gap but that the effects are probably mostly small and indirect. As such, researchers need to determine both the magnitude of the effects and mediators between crowding and school success. Policymakers and practitioners should probably avoid massively expensive interventions to expand the size of houses and apartments but should explore ways to make tighter confines less stressful (e.g. placement of walls, windows, access to open areas, etc.).

Noise. The final neighborhood-level stressor I discuss is noise. Research on noise has been largely confined to a small sub-field and ignored by education researchers.

Links to poverty. The noisiness of highways, airports, train tracks, factories, and other features reduce the desirability of a neighborhood and depress local home prices. As a result, lower-income children are more likely to live in noisier environments than their better-off peers (Evans & Kantrowitz, 2002), which research has long found increases stress (D. C. Glass & Singer, 1972).

Empirical evidence. This can be seen both at home and in schools. One study in New York City compared students on the side of a school right next to elevated train tracks and found that they performed worse than those on the opposite, quieter, side of the school. After installing noise dampening devices on the tracks and heavy insulation in the ceiling, noise was reduced and test scores were equal the following year (Bronzaft, 1981), though methods were shaky – mostly relying on the word of principal that students were comparable across years. A similar forthcoming article finds evidence that attending school near London’s Heathrow Airport (resulting in more airplane noise in the classroom) negatively affects reading comprehension six years later (Clark, Head, & Stansfeld, in press).

Theory. Other studies have found associations between levels of noise and language acquisition (Evans & Maxwell, 1997) and reading ability (Maxwell & Evans, 2000). One study used apartment buildings next to highway buildings to study the effect of household noise on children’s verbal abilities (S. Cohen, Glass, & Singer, 1973); higher floors were less noisy and, controlling for other background factors, the children that lived there also scored higher on assessments of both their auditory perception and verbal achievement.

Studies on the effects of noise exposure also found that students exposed to more noise exhibited higher blood pressure and shorter attention spans (S. Cohen, Evans, Krantz, & Stokols, 1980) in addition to more socio-emotional problems (Evans & English, 2002) and that neighborhood noise predicted more feelings of powerlessness (Ross, et al., 2001).

Empirical evidence. The ability to reduce noise will vary widely across different environments. Not many local governments, for example, will want to close an airport to reduce background noise for nearby neighbors. Other public projects, like highways, can be built with more noise-reducing features and, in some cases, farther from homes, and building codes can be changed for homes in noisy areas to require more noise-dampening insulation, but most policies will lead only indirectly to small changes in noise levels.

Summary. Again, it seems unlikely that noise has direct and large effects in most instances on academic performance, but extreme cases certainly merit further attention – as do the possible socio-emotional consequences of noise exposure. Overall, I rate noise thusly:

Empirical Evidence: 1

Theory: 2

Policy Malleability: 2

Total: 5

Recommendations for research, policy, and practice. While the direct effects may not be large for most students, however, the fact that noise is tangible, easily measurable, and sometimes easily reduced makes it a prime candidate for social policy intervention. As such, researchers should strive to learn what levels of noise have small and large effects while policymakers and practitioners should probably make noise a secondary priority in all but the worst cases.

Homeownership. While neighborhoods matter, clearly not all neighbors achieve equally. One difference between residents of the same neighborhood is renting versus owning a home. Policymakers from across the political spectrum often see homeownership as a worthwhile aspiration for virtually all Americans, and homeownership rates across the country have steadily risen over the past century (A. F. Schwartz, 2010).

Links to poverty. Owning a home requires a good bit of financial wherewithal, so homeownership rates vary widely between classes. On average, homeowners make roughly twice as much money (\$64K vs. \$33K), possess fifty times as much wealth (\$243K vs. \$5K), and are more than three times less likely to be in poverty than renters (A. F. Schwartz, 2012).

Empirical evidence. Multiple studies find a positive relationship between homeownership and academic performance, even after accounting for other variables. Partially as a result of these changes in behavior, they find the children of homeowners may stay in school longer and be less likely to become pregnant as a teenager (Green & White, 1997). Aaronson (2000) and others argue that part of the explanation may be family characteristics that are associated with homeownership, but even after controlling for these he still finds argues that homeownership makes a significant contribution to achievement due to increased residential stability. After becoming homeowners, families may experience better home environments, fewer child behavior problems, and have children with higher cognitive achievement (Haurin, Parcel, & Haurin, 2002). More recent studies, however, question these

earlier results and find no statistically significant impact of homeownership on achievement when using quasi-experimental research designs (See, for example: Barker & Miller, 2009; Holupka & Newman, 2012; Mohanty & Raut, 2009). The mixed evidence muddies the water on the issue.

Theory. Why the relationship? Homeownership may produce positive externalities, as homeowners subsequently experience higher incomes later in life (Di, 2007); invest more in social capital (DiPasquale & Glaeser, 1999); have higher rates of political engagement (Engelhardt, Eriksen, Gale, & Mills, 2010); save more money (Grinstein-Weiss, Key, Guo, Yeo, & Holub, 2011); move less frequently (See, for example: Galster, Marcotte, Mandell, Wolman, & Augustine, 2007; Holupka & Newman, 2012); have higher expectations for the future (Elliott, Kim, Jung, & Zhan, 2010); have higher self-esteem (Balfour & Smith, 1996); focus more on the future (Sherraden, 1991); often move to better neighborhoods (Santiago et al., 2010); and live in homes in better physical condition (Spivack, 1991). The evidence on residential stability, community engagement, home environment, and asset-building are particularly compelling and merit attention on their own, but the possible effects of homeownership on future orientation, personal status, expectations/aspirations, and physical housing conditions make homeownership that much more interesting.

Policy malleability. The tangibility of homeownership makes it easy target, but short of giving homes to people the path can be long and winding. Options include incentivizing saving with Individual Development Accounts (Grinstein-Weiss, Chowa, & Casalotti, 2010) which has increased saving among participants (Grinstein-Weiss et al., 2009); building more affordable owner-occupied homes – which could follow various models, including New York City’s (Chellman, Ellen, McCabe, Schwartz, & Stiefel, 2011), Montgomery County, Maryland (H. L. Schwartz, 2010), Habitat for Humanity, or HOPE VI (Turner, 2009); offering homeownership and financial management classes – one study found that pre-purchase homeownership counseling reduced the rate of mortgage delinquency at day 90 by 19% overall and by up to 34% in the most effective programs (Hirad & Zorn, 2001); and offering mortgage assistance.

Summary. Overall, the empirical evidence is mixed but the theory is strong. The effects of homeownership are tough to disentangle, but we have strong reason to believe that homeownership affects a wide array of factors associated with academic performance even if the effects may not be immediate or direct. Overall, I rate homeownership thusly:

Empirical Evidence: 2

Theory: 3

Policy Malleability: 2

Total: 7

Recommendations for research, policy, and practice. Increasing homeownership rates among lower-income families, of course, is no panacea – as evidenced by the recent sub-prime mortgage crisis. Researchers should continue to investigate the long-run and indirect consequences of homeownership with a particular emphasis on before-and-after studies of people who purchase homes and longitudinal analyses of interventions and policies designed to encourage homeownership. Practitioners and policymakers have every reason to believe that a primary focus on homeownership will yield benefits but, given the mixed research results, should keep an eye on the factors above rather than making homeownership the sole goal.

Mobility and homelessness. The most compelling evidence regarding possible effects of homeownership is regarding increased residential stability. Mobility is widely studied, often in tandem with homelessness (partly because homelessness is most frequently experienced by those who are highly mobile and partly because mobility often leads to homelessness). Indeed, the effects can be tough to disentangle.

Links to poverty. The largest contributing factor to homelessness and mobility is the ability to afford a residence, so higher-income families are of course less likely to be affected than low-income families.

Empirical evidence. One study of homeless children found that that mobility negatively impacted achievement while homelessness did not (Buckner, Bassuk, & Weinreb, 2001). Another review, however, finds that homeless children’s lives are similar to other low-income children’s lives in all areas except for residential mobility and isolation (P. M. Miller, 2011).

Mobility may have particularly strong effects on children earlier in life, though children also tend to move less frequently as they grow older (Ingersoll, Scamman, & Eckerling, 1989). One study finds that moving to different residences as a child decreases the odds of high school completion (Haveman, Wolfe, & Spaulding, 1991). Another finds that student mobility harms not only their own achievement but the achievement of their school peers (Hanushek, Kain, & Rivkin, 2004). A forthcoming study of homeless and highly mobile students found that about half seemed quite resilient and performed no differently than their peers, but that overall math and reading achievement were lower (Cutuli et al., in press). And a review of six neighborhood factors found that residential mobility was the most strongly related to academic performance (Leventhal & Newman, 2010). Together, they offer compelling evidence that children who move frequently perform worse in school.

Empirical evidence. Disentangling the causes of mobility from its effects is difficult (e.g. whether a child struggles because they moved so often or because of the financial and other issues that led to them moving so often), but a range of studies offer evidence of multiple pathways through which mobility and homelessness could influence academic performance. One study found that homelessness increases stress and depression in mothers (Banyard & Graham-Bermann, 1998). Another study found that housing uncertainty reduced patience in children and speculated that the increased preference for short-term benefits could lead to higher drop-out rates (Anil, Jordan, & Zahirovic-Herbert, 2011). A

study of children’s executive function skills found that they are even more important when predicting the success of homeless and highly-mobile children than other children (Masten et al., 2012), which aligns with a forthcoming study that finds that, among poor children, moving three or more times in the first five years of life significantly increases attention problems and internalizing/externalizing behavior associated with behavior problems (Ziol-Guest & McKenna, in press). And a recent review of the research finds evidence the homelessness (which affects over one million children) negatively affects physical and mental health in addition to academic achievement (Tobin & Murphy, 2013). Together, the studies offer compelling evidence that mobility and homelessness affect families and children in ways that make sense on face – it is hard to imagine either not being destabilizing, stressful, and even humiliating.

Policy malleability. Fighting homelessness is conceptually straightforward – make sure families have a place of their own to live – but practically difficult. Providing more shelters and/or public housing is one (potentially costly) option, but some families may prefer to stay with relatives or find their own way instead.

Summary. Overall, there is fairly solid evidence that mobility negatively affects many children – though it remains unclear exactly what effects homelessness has on top of the mobility piece. Indeed, the effects of homelessness seem to vary widely depending on the student and the context – which makes sense given the wide spectrum of homelessness experienced by children ranging from living in parks to relatives’ homes for a few days or over the course of many years. Overall, I rate homelessness/mobility thusly:

Empirical Evidence: 2

Theory: 3

Policy Malleability: 2

Total: 7

Recommendations for research, policy, and practice. More research is needed to disentangle the effects of mobility versus homelessness and the differential effects of different types of mobility and homelessness on different children. Nonetheless, even if mobility is the real driver of negative effects, reducing homelessness would simultaneously reduce mobility. Given the empirical evidence and well-supported theory, mobility and homelessness certainly deserve a spot near the top of the list of factors researchers should investigate and practitioners and policymakers should seek to address – particularly since current policy seems to only address the needs of small sub-groups of homeless families (Shelton, Mackie, van den Bree, Taylor, & Evans, 2012).

Discussion. Considerable evidence exists that neighborhood and housing conditions/factors affect children’s academic performance through a variety of pathways that align with the theories discussed earlier and should be taken into account by policymakers and practitioners and investigated further by researchers. A few trends emerge across the factors and conditions reviewed above.

We should be concerned about the stressors to which students are exposed. Research on disorder, crime, violence, noise, crowding, physical conditions, and mobility all consistently find that children reacted to elevated levels of these factors in ways consistent with stress reactions, including worsened physical and mental health, reduced non-cognitive abilities, and increased behavior problems. One rule of thumb when designing housing and neighborhood interventions should be that reducing stressors is likely to produce positive outcomes.

We should also be concerned with the normative behaviors to which students are exposed in their neighborhoods. In housing policies designed to move students to lower-poverty neighborhoods, new residents likely see more employed neighbors and fewer who engage in illicit activities than residents in many impoverished neighborhoods. Since seeing rules broken can encourage people to break other rules (Keizer, et al., 2008), it stands to reason that seeing fewer rules broken may also lead

residents to comply with other rules (e.g. paying attention in class or completing homework). Exposure to more socially responsible behavior may positively influence the aspirations of child residents; in an extreme case, it may mean that a child who previously idolized a drug dealer now idolizes a nurse or police officer. It may mean that graduating from high school and attending college is seen as something that most people tend to do and to which a child should aspire. In this sense, the isolation described by the “culture of poverty” theorists can reduce aspirations. Five years after the conclusion of the New Hope project, the treatment group children were still significantly more optimistic about their future, and boys had significantly higher expectations for their academic performance (Huston, Walker, Dowsett, Imes, & Ware, 2008). Housing changes may affect students similarly.

And we should be concerned with how residents relate to/with their neighbors. Research on the social organization of neighborhoods, homeownership, and mobility all find largely positive effects of increased communication and cooperation between residents of a neighborhood. Increased residential stability and decreased disorder, violence, and crime likely lead more neighborhood stability and interaction and a subsequent increase in social capital. Neighborhoods in which people know each other and look after each other likely foster children who grow up with healthier habits and a more positive outlook on life.

Research on these topics should also consider two ideas currently absent from most research linking neighborhoods and housing with academic performance and related outcomes.

First, when investigating neighborhood effects we would do well to remember that a family’s social network is only loosely coupled with their neighborhood. As such, we should not expect to find large effects, in most cases, of the immediate neighborhood in and of itself. Nor should we interpret small or null results when measuring neighborhood influences as evidence that the environment and context in which a child grows up does not matter. As Bronfenbrenner and others argue, the most immediate relationships for a child are not just the people in their neighborhood but the people in their

family, their church, their school, and so on. The conditions and people involved with these institutions should be taken into account when measuring the influence of immediate surroundings on children.

Second, almost none of the research above examines policy interventions or before-and-after exposure to the various conditions/factors. The vast majority of the research is cross-sectional and the longitudinal research usually just measures children over time rather than children who change living conditions. In some of the cases above, significant interventions already exist (e.g. homeownership programs and homeless shelters) that scream for program evaluations that investigate their effects on academic performance.

Together, the evidence and theory on housing and neighborhood conditions/factors paint a picture of a complex relationship between place and student performance. None of the conditions/factors above are likely to result in immediate, large, and direct improvements for most children, but all merit further investigation by researchers and attention from policymakers and practitioners. Given the indirect and intertwined relationships, all three groups may want to consider neighborhoods and housing more holistically when conducting research and designing or implementing policy or interventions. Given limited resources and attention, however, that will not always be possible. In such cases, an evaluation of the empirical evidence, theory, and policy malleability find strong support that policy aimed at homeownership, homelessness/mobility, and crime/violence can narrow the achievement gap and merit direct attention; moderate evidence that policy aimed at disorder, social organization, physical conditions, and noise can do the same and merit secondary consideration; and little evidence that public housing should receive significant individual attention – though attributes of different developments certainly deserve further scrutiny.

Health and Health Care

A wide body of literature consistently finds that those who with fewer financial resources experience far more health problems; from asthma to zinc deficiency (see, for example: Egbuonu & Starfield, 1982; Kelly, Madeleine, Carolyn, Tod, & Raoul, 2006; Rosenbaum, 2008). Indeed, the most convincing section of Rothstein's (2004) book is his writing on health and academic performance. Other attempts to identify health problems disproportionately affecting poor and minority children that also influence achievement have focused on specific diseases and narrow problems like lead poisoning, ADHD, asthma, and breakfast consumption (Basch, 2010; Currie, 2005), but I focus on larger issues and umbrella issues that cause or encompass these diseases and narrower problems.

Reviews have found that SES is associated with a wide range of health and socio-emotional outcomes in children (R. H. Bradley & Corwyn, 2002); that the links between SES and child health likely play a role in the intergenerational transmission of status (Currie, 2009); that both poverty and inequality negatively impact children's health (Feudtner & Noonan, 2009); and that the most recent evidence supports links in both directions between health and education (Eide & Showalter, 2011). Forthcoming research finds that inequality of health outcomes and mortality rates have not changed in the past century (Haines, In Press). And one estimate is that as much as one-quarter of the school readiness gap between Black and White children may be explained by health (Currie, 2005). Plus, health does not only affect academics; effects of poor health continue past school and affect employment and earnings later in life (Haas, Glymour, & Berkman, 2011).

The impacts of poverty on health and health on education are complex and follow multiple pathways (McLoyd, 1998). At the neighborhood level, neighborhoods with more cohesion and with community health care options fostered better health (Aysola, Orav, & Ayanian, 2011) as did higher rates of social capital (Carpiano, 2006) and more collective efficacy (Sampson, 2003). Physiologically, more time spent in living in poverty earlier in life was associated with more inflammation later in life (Carroll, et al., in press). And in the long-run, every 10 percentage points above a 20% poverty rate in a

neighborhood in which one resides increased the odds of mortality by 89% (Do, Wang, & Elliott); likely because neighborhood disadvantage is significantly associated with multiple biological risk factors (King, Morenoff, & House, 2011). A review of international research on urban kids finds similar results (De la Barra, 1998).

As the section unfolds, the reader will see that a wide number of health conditions are both disproportionately experienced by lower SES families and – to varying degrees of certainty – linked to academic performance. Below, I explore the factors/conditions that receive the most attention in the research literature.

Nutrition. As Americans' health has worsened in recent decades, attention has increasingly been directed to our diet.

Links to poverty. Studies have found that low-income families in areas with low access to food stores purchase fewer fruits and vegetables (Kyureghian, Nayga, & Bhattacharya, 2013); that diets high in sweets and fats cost less than those high in fruits and vegetables (Drewnowski, Darmon, & Briend, 2004); and that changes in income result in the purchase of higher-quality vegetables (Kuchler, 2011) – all of which are important findings given the significant role fruit and vegetable consumption plays in psychological well-being (Blanchflower, Oswald, & Stewart-Brown, 2012). This has led to a call for educational researchers to pay more attention to the food served in schools (Weaver-Hightower, 2011) – which makes sense, but we should remember that most students consume far more food outside of school than inside.

Empirical evidence. One recent study, controlling for student background by using propensity score matching, found that inner-city students who consume fast food at least four times per week score a full one-half of a standard deviation lower in both math and reading than those who eat fast food 0-3 times per week (Tobin, 2013). Another study found that the nutritional quality of children's

breakfast predicted reading and math scores independent of SES (O'Dea & Mugridge, 2012). Indeed, a review of the literature found strong evidence of a link between breakfast and academic achievement for low-income children (Basch, 2010).

Theory. A number of studies have linked various nutritional factors with lower cognitive functioning – from iron deficiency (Halterman, Kaczorowski, Aligne, Auinger, & Szilagyi, 2001) to breakfast consumption (Kleinman et al., 2002; J. M. Murphy et al., 1998).

In another study, (Schoenthaler, Amos, Eysenck, Peritz, & Yudkin, 1991), students in New York City were given vitamin-mineral supplements or placebos in different amounts. Students who were given the vitamin-mineral supplements performed significantly better on IQ tests, and students who received larger doses performed better than those who received smaller doses. Over the years, this study and other similar trials were the subject of much scrutiny. A larger, double-blind study using vitamin/supplements and placebos replicated the consistent finding that students taking the supplement gain about three additional IQ points over a three month period (Schoenthaler, Bier, Young, Nichols, & Janssens, 2000).

In terms of figuring out why and how nutrition affects academic performance, most studies have focused on cognitive function; a review of the literature on the influence of children's diet on their cognition found plentiful evidence that "diet can influence the development and functioning of the brain" (Benton, 2008, p. 25).

It stands to reason that those who are hungry or malnourished will not perform as well as those who are not, but the impact of nutrition on performance likely extends to consumption of particular vitamins and minerals, processed foods, fresh fruits/vegetables, and the timing of consumption (e.g. eating breakfast). A growing body of literature details the ways in which poverty impacts these choices and how these choices impact children's physical and emotional well-being and ultimately their academic performance.

Policy malleability. Beyond income, nutritional choices are affected by what is available in school, in the neighborhood, what children see on TV (Wiecha et al., 2006), and myriad other factors. School health programs have had some success improving nutrition (Murray, Low, Hollis, Cross, & Sally M. Davis, 2007), but people can be stubborn about what they eat. In one experiment, for example, students were either told that they should eat more fruit, told that their friends eat lots of fruit, or told nothing; those who were told to eat more fruit actually reported eating less fruit than the control group (though, in reality, consumed similar amounts), while the students who were told that their peers eat lots of fruit consumed significantly more (Stok, de Ridder, de Vet, & de Wit, 2013). Changing not only the purchasing habits but the consumption habits of families, yet alone their children, is likely tricky for large-scale policy to accomplish but there is much that individual schools, organizations, and communities can do to improve nutrition.

Summary. Significant details are missing regarding exactly which aspects of nutrition are most important, and changing eating habits may be particularly hard, but we have enough empirical evidence to proceed, particularly given the strong theory backing this evidence. Overall, I rate nutrition thusly:

Empirical Evidence: 2

Theory: 3

Policy Malleability: 2

Total: 7

Recommendations for research, policy, and practice. The moderately strong evidence and very strong theory in addition to the ease with which one can grasp the topic make nutrition deserving of more attention when studying and trying to narrow the achievement gap. As such, researchers should focus both on figuring out which aspects of nutrition matter and how change those consumption habits while policymakers and practitioners should make healthier eating in general a focus of interventions designed to narrow the achievement gap.

Physical fitness. A wide body of literature links physical activity and physical fitness with race and income and, increasingly, cognitive performance.

Links to poverty. A study of different types of populations in the U.S. found that lower-income and urban residents exercised far less than higher-income and suburban residents and reported fewer parks and other places to work out nearby (Parks, Housemann, & Brownson, 2003). A study in England observed more than four times as many adults running in a high-SES neighborhood as in a low-SES neighborhood (Nettle, 2011). While team sports are often available in low-income areas, fitness centers and activities requiring specialized facilities (e.g. swimming or golf) are less common (Saint Onge & Krueger, 2011).

Empirical evidence. A number of small-scale studies have examined how these fitness discrepancies might impact achievement discrepancies. A study of 3rd and 5th graders in Illinois found that higher aerobic fitness and lower BMI were associated with higher achievement scores in math and reading (Castelli, Hillman, Buck, & Erwin, 2007). A study of 4th, 6th, and 8th graders in Massachusetts found that those who passed more physical fitness tests were more likely to pass state reading and math tests (Chomitz et al., 2009). A study of 5th graders found that aerobic capacity significantly predicted academic achievement on state tests in four subjects independent of BMI and demographic factors, but that the correlation between other measures of fitness (e.g. abdominal strength and flexibility) and achievement disappeared after controlling for other factors (Wittberg, Northrup, & Cottrel, 2009). And researchers in other countries have reached similar conclusions: for example, a study of 9th grade students in Sweden found that academic achievement was positively associated with physical activity and fitness for girls and with physical fitness for boys (Kwak et al., 2009). While the studies are mostly small, as a body the wide range of studies offer compelling evidence that *something* about fitness matters.

The topic has received increasing attention the past decade, and reviews of the research have reached different conclusions as time has passed and evidence has accumulated. An earlier review concluded that there was solid evidence regarding physical activity's impact in the short-run but little evidence of long-run effects on academic achievement (Taras, 2005). A few years later, another review of the research cautioned that while positive associations exist between physical fitness and both academic achievement and cognition, the studies were mostly correlational and provide only weak evidence that an intervention that increased physical fitness would subsequently increase academic performance (Keeley & Fox, 2009). Two reviews conducted the next year concluded that there is mounting evidence that physical activity is positively associated with academic performance (Trudeau & Shephard, 2010) and that an "emerging literature" supports various ways that physical activity and fitness can impact cognitive function and educational outcomes (Basch, 2010). And the most recent review compiled 125 studies – 53 of which were from the past 5 years – and found both that the majority find positive effects of physical activity on factors related to academic achievement and that methodology has improved in recent years (Howie & Pate, 2012). The differing conclusions over time are consistent with both confusion regarding exactly what about fitness impacts academic performance in what ways and with a nascent and developing field of research.

Theory. Why the link? A review of the psychological literature on both animal and human research concludes that exercise enhances children's executive function (Tomporowski, Davis, Miller, & Naglieri, 2008). Indeed, studies have found that children with higher aerobic capacity perform better on tests of executive control (Hillman, Buck, Themanson, Pontifex, & Castelli, 2009) and that more physically active children demonstrate more attentional control (Winneke, Godde, Reuter, Vieluf, & Voelcker-Rehage, 2012). Indeed, a recent meta-analysis of the research finds consistent evidence of positive effects of acute physical exercise on executive functions (Verburgh, Königs, Scherder, & Oosterlaan, 2013).

This is likely rooted in physiological changes. A study of mice found evidence that physical activity spurred biogenesis, which is directly related to the functioning of the nervous system (Steiner, Murphy, McClellan, Carmichael, & Davis, 2011); this aligns with a study of children that found those with the highest levels of fitness had the most cognitive control, indicating the highest-functioning neural networks (Voss et al., 2011). A review of the research finds promising evidence that, due to the effect on neural functioning, exercise programs may be positive interventions for children with ADHD (Berwid & Halperin, 2012). Given the evidence of aerobic exercise on neural functioning, a new study using rats tested whether resistance exercise had similar effects and found that it does – observing improved spatial learning and memory after 8 weeks of training (Cassilhas et al., 2012). A recent review finds evidence from neuroimaging studies that physical activity improves brain structure and function but also may decrease drug usage (Hillman & Drobles, 2012). In short, physical activity and fitness improve overall physiological functioning in myriad ways and this improved functioning should improve brain functioning and behavior in ways that increase learning.

Lastly, activity and fitness may promote not just cognitive functioning, but psychosocial functioning. A forthcoming study finds that girls who engaged in high levels of physical activity had higher self-efficacy, felt more supported by friends and family, and practiced better self-management strategies (Taverno Ross, Dowda, Beets, & Pate, in press).

Policy malleability. While increasing physical fitness can be very difficult, it also may be easier for schools and communities to envision small, tangible steps they can take. The most obvious step for schools to take is to increase physical education time: indeed, a recent analysis found that girls who spent more time (70-300 minutes/week) in physical education while in school outperformed those who spent less (0-35 minutes/week) (Carlson et al., 2008) and an earlier experiment found that a doubling of physical education time yielded higher test scores (Sallis et al., 1999). Another school-based intervention offered children the opportunity to win prizes if they walked or rode their bikes to school

and observed a 16% increase in bike ridership (Cuffe, Harbaugh, Lindo, Musto, & Waddell, 2012).

Outside of school changes, though, will likely prove more difficult.

Summary. Overall, both the evidence and theory supporting the notion that physical activity and fitness improve academic performance are quite solid, but significant gaps in knowledge remain. The dosage and type of activity certainly matters, for example, and we need to know when returns to fitness are at their peak in order to efficiently allocate time and resources. Overall, I rate physical fitness thusly:

Empirical Evidence: 2

Theory: 3

Policy Malleability: 2

Total: 7

Recommendations for research, policy, and practice. Researchers should focus on learning exactly what types of activities and which attributes matter most – and to what degree – in addition to examining both the efficacy of programs designed to increase activity/fitness and the trade-offs of spending more time in, say, gym class than math class. Policymakers and practitioners should make increased physical activity and fitness a major focus of interventions, but not at the expense of all other factors – it would certainly be a mistake, for example, if a summer program aimed to improve achievement solely by putting kids through aerobics all day without addressing nutrition or other areas of health yet alone cracking open a book.

Obesity. Recently, public attention has increasingly focused on the fast-rising obesity rates in the United States. Given that nutrition and physical fitness both seem to influence academic outcomes, there is reason to suspect that obesity (which is closely related to the two) may as well.

Links to poverty. The evidence that obesity hits high-poverty areas harder, however, is mixed. An earlier paper noted that children were four times more likely to be classified as overweight in 2000 as they were in 1965, but found no evidence that poor children were more likely to be overweight (Hofferth & Curtin, 2005). More recent research, however, found that BMI was negatively correlated with income for all demographic groups of students other than Black males (Murasko, 2011) and that family poverty, parental education, and school-level poverty all predict obesity in students (Martin, Frisco, Nau, & Burnett, 2012).

Neighborhood research, meanwhile, suggests that inner-cities are hit disproportionately by obesity (Lopez & Hynes, 2006); that those who express more concerns about neighborhood safety are more likely to be obese (D. Duncan, et al., 2009); and that neighborhoods with fewer supermarkets/food stores and fitness facilities, more commercial land usage, and lower income experience more obesity (Black, Macinko, Dixon, & Fryer, 2010). Similarly, one study finds that each additional Wal-Mart constructed per 100,000 residents raises obesity rates by 2.3 percentage points and may account for over 10% of the rise in obesity over the past 25 years (Courtemanche & Carden, 2011); while Wal-Marts are not concentrated in the inner-city, businesses that sell similar goods may have similar effects. And another study found that students who participated in organized summer activities (versus remaining in parent care) were less likely to become obese the following year (Mahoney, 2011).

Empirical evidence. The evidence regarding obesity's impact on academic performance is similarly mixed. Numerous studies find an association between obesity and academic performance, but obesity may not be the real driver. One study finds that children's weight was negatively associated with their reading, math, and science scores, but that the relationship disappears after controlling for fitness, blood pressure, and demographic factors (Cottrell, Northrup, & Wittberg, 2007). Another study using instrumental variables finds that a one standard deviation weight gain (25-30 pounds) is associated with a 4-5 percentile point lower GPA among 14-17 year-old white females, but finds little

evidence of a relationship among other groups (Sabia, 2007). Another study found that overweight students earned lower grades (.4 GPA points), earned lower reading scores, attended school less frequently, earned more detention, participated in fewer sports, and were less fit – but they used fitness as an outcome variable rather than controlling for it (Shore et al., 2008). A study of West Virginia, meanwhile, finds relationships between obesity and reading proficiency in high-poverty districts, but not in other districts (Gurley-Calvez & Higginbotham, 2010). And a study in South Carolina finds no relationship between obesity and test scores after controlling for SES (Baxter, Guinn, Tebbs, & Royer, 2013).

Theory. Evidence regarding a possible causal mechanism linking obesity and academic performance is somewhat sparse. One study finds that obesity was negatively related to reaction time and an overall decreased ability to exercise cognitive controls, but nutrition and fitness levels were not examined as possible mediators (Kamijo et al., 2012).

Policy malleability. Altering obesity may prove even tougher than changing nutrition or physical fitness since one can change one and compensate by changing the other (e.g. exercising more but also eating more). Policies aimed at changing either are likely to have positive effects, though (even if they do not change obesity). Increasing time spent in physical education, for example, reduced BMI increases in girls between kindergarten and first grade in one study (Datar & Sturm, 2004).

Summary. Overall, the evidence points toward fitness and nutrition as the real drivers of academic performance rather than obesity. Indeed, many in the medical community are starting to recognize obesity as a *symptom* (often of metabolic syndrome) rather than a problem in and of itself.

Overall, I rate obesity thusly:

Empirical Evidence: 1

Theory: 1

Policy Malleability: 1

Total: 3

Recommendations for research, policy, and practice. Functionally, it may not really matter whether obesity is affecting academic performance independent of fitness and nutrition since interventions aimed at reducing obesity would almost certainly aim to increase physical fitness and/or nutrition in order to accomplish this. In other words, trying to reduce obesity will likely yield positive results.

There are, however, social dynamics worth considering: obesity may be “contagious,” according to one study that finds that students’ behaviors are altered by their friends’ obesity-related behaviors (exercising, playing sports, watching TV, playing video games, sleep deprivation, breakfast consumption, fast food consumption, fruit/vegetable consumption, and calorie-dense snack consumption) (Ali, Amialchuk, & Heiland, 2011). In this sense, interventions aimed at reducing obesity, or improving nutrition/fitness, should take students’ relationships into account. It is also possible that obesity affects self-image and psychological well-being in ways that negatively impact performance.

In the end, obesity itself is probably not a significant driver of the achievement gap, but reducing obesity may still be a worthy goal – and may necessitate addressing sleep and stress in addition to nutrition and fitness. As such, researchers should continue to try to disentangle the effects of obesity from those of nutrition and fitness while also investigating the outcomes of interventions aimed at reducing obesity while policymakers and practitioners should probably proceed with interventions aimed at obesity with the caveat that they keep an eye on fitness, nutrition, and other factors rather than making obesity reduction the sole goal.

Mental Health. Given the evidence above regarding the relationship between poverty and both stressors and cognitive functioning, it makes sense that mental health would also be a concern.

Links to poverty. Indeed, a bevy of evidence exists tying poverty, neighborhoods, and environmental conditions with mental health of both mothers and children. At the individual level, a longitudinal study found that whether and how long children had lived in poverty predicted trajectories of mental health and antisocial behavior (McLeod & Shanahan, 1996). At the neighborhood level, a study of 3-year olds across 8 cities found that living in neighborhoods with higher poverty rates led to less social support and less effective coping strategy usage among mothers (Klebanov, Brooks-Gunn, & Duncan, 1994) and a forthcoming study finds that neighborhood poverty and unemployment rates led to lower social support and perceptions of neighborhood cohesion, which then led to greater internalizing symptoms among adolescents (Hurd, Stoddard, & Zimmerman, in press). Another study found that physical deterioration in neighborhoods decreased social capital and contact and increased perceptions of crime, which led to more stress depressive symptoms (Kruger, et al., 2007) and physical conditions of the housing in which one lives may also influence mental health (Evans, Wells, & Moch, 2003). Lastly, an evaluation of experimental evidence from MTO found that those who moved to lower-poverty neighborhoods experienced significant gains in mental health and subjective well-being despite not seeing many other economic and educational gains (Ludwig et al., 2012).

Empirical evidence. Research on mental health problems tends to focus more on its causes than its educational outcomes, perhaps because it seems so obvious that negative consequences *must* follow. Multiple studies do, however, find effects of mental health issues on students: one study found that adolescent depression increased the risk of underachievement (Ferguson & Woodward, 2002); a longitudinal study that tracked students from 1st grade through 12th grade found that mental health significantly predicted GPA trajectories (Gutman, Sameroff, & Cole, 2003); and a study of college freshmen found that social support and coping strategies significantly predicted college GPA and retention (DeBerard, Spielmans, & Julka, 2004).

Theory. The “why” part of the relationship between mental health and academic outcomes is more readily apparent in many cases – students who are struggling with major mental health issues will tend to be distracted and generally function at a lower level. The relationship between maternal mental health and children’s academic performance is slightly more complex. One study found that mothers’ use of coping strategies significantly predicted home learning environment and home physical environment and that mothers’ social support predicted home learning environment (Klebanov, et al., 1994). Maternal depression and perceived emotional support also significantly predicted child behavioral problems in another study (Leadbeater & Bishop, 1994). It stands to reason that if mothers are distracted and functioning at a lower level that this would impact children – altered parenting techniques, reduced focus on home environment, and strained parent-child relations can all lead to negative experiences for children.

Policy malleability. Large-scale interventions to improve maternal and child mental health may be even harder to implement than interventions designed to address other factors/conditions discussed in this paper – particularly given the widely varying conditions and causes of those conditions across the population. Taking small steps to reduce disorder, violence, and stress and improve home environments and parent-child relations will likely help, but sending teams of therapists into homes and schools may be beyond the scope of what many policymakers are willing to undertake.

Summary. Overall, the evidence is very solid that poverty impacts mental health; that mental health impacts academic performance; and that we have identified multiple causal mechanisms that form a working theory to explain this relationship. Overall, I rate mental health thusly:

Empirical Evidence: 2

Theory: 2

Policy Malleability: 2

Total: 6

Recommendations for research, policy, and practice. Researchers should focus on learning which aspects of mental health most affect academic performance in addition to assessing the efficacy of large-scale interventions while policymakers and practitioners should make mental health a major emphasis of interventions – but probably should not count on anything other than personal relationships showing dramatic results.

Prenatal care. Lower-income families are less likely to have health insurance and access to medical facilities, reducing the quality of prenatal care they receive.

Links to poverty. It has long been known that prenatal conditions affect child development and life outcomes, including: smoking (Rantakallio, 1983), air pollution (Currie, 2011; Maisonet, Correa, Misra, & Jaakkola, 2004) substance abuse (Yumoto, Jacobson, & Jacobson, 2008), and other factors – and the evidence of such relationships has gotten stronger over time as new people (particularly economists) have used new methods to test earlier findings (Almond & Currie, 2011).

Empirical evidence. A growing evidence base supports the theory that the effects of prenatal care on health and development extend to educational outcomes. One study found that low birth weight was associated with lower math and reading scores at age 5 net of family characteristics (Goosby & Cheadle, 2009). A follow-up study compared low birth weight children to siblings and found that low birth weight also predicted slower cognitive development into adolescence and lower graduation rates (Cheadle & Goosby, 2010). Unfortunately, most research has focused on developmental and cognitive outcomes rather than academic ones.

Theory. The basic theory behind these results is pretty simple – if prenatal conditions impact health and development, they should also impact educational outcomes – though the exact relationships between various conditions in the womb and different educational outcomes present make the picture more complex. One worry of such research is that prenatal conditions may be

endogenous – that those who receive less prenatal care also live in poorer neighborhoods, receive less parental care, and attend worse schools. A new working paper, however, addressed these concerns by studying twins in Florida and finds that cognitive development changes little over time independent of school effects and that neonatal health sets children on this trajectory early in life (Figlio, Guryan, Karbownik, & Roth, 2013).

Policy malleability. Baseline policy interventions are quite straightforward, but more research is needed before we can know which comprehensive design would work best. Among other options, we can subsidize prenatal care or create institutions in which low-income expectant mothers receive guidance on prenatal care. An experiment in which the lowest-income residents received income transfers resulted in better prenatal health and fewer low birth weight babies among women facing high-risk pregnancies (Kehrer & Wolin, 1979). And students who attended a school for pregnant teenagers in New Haven, CT were less likely to give birth to preterm or low-birth weight babies when they attended the school for longer periods of time (those who conceived early in the calendar year spent less time in the school due to summer vacation and served as the comparison group) (Seitz & Apfel, 1994).

Summary. Overall, the evidence and theory that prenatal care impact academic performance are quite strong – though we still need to know exactly which conditions affect children in exactly which ways. Overall, I rate prenatal care thusly:

Empirical Evidence: 2

Theory: 3

Policy Malleability: 2

Total: 7

Recommendations for research, policy, and practice. Prenatal care offers a particularly strong lever on which to push if we want to use social reform to narrow the achievement gap and, as such,

researchers should examine the best ways to improve pre-natal care while practitioners and policymakers should make improved care a major focus of interventions.

Vision. Teachers often encounter kids who complain about not being able to see what is on the board, but we do not often consider these problems when studying education policy.

Links to poverty. Research has linked poverty with vision problems (College of Optometrists in Vision Development, 2000), largely because low-income families have less access to health insurance and health care and less money to spend on glasses and other remedies. The straightforward relationship between vision problems and academic problems and simplicity of designing interventions that remedy vision problems make this an eminently actionable problem for policymakers and practitioners to address.

Evidence. Perhaps the most promising studies for advocates of social reform are a trio of trials involving vision therapy. One experiment in Baltimore (Harris, 2002) randomly assigned students with vision problems to either a control group or one that received vision therapy over the course of a school year. By the end of the year, those who had received vision therapy scored significantly higher on math and reading achievement tests than had those who had not. The authors conclude that eyesight is an important determinant of reading ability and that sight problems can be overcome in a scholastically relevant manner.

Another study (Orfield, Basa, & Yun, 2001) tracked the academic performance of students in an inner-city Boston school over the course of six years. They found that nearly half of the students failed a pre-screening eye test and that these students scored significantly lower on math and reading achievement tests than those who passed. Students who failed an eye exam were either provided with vision therapy, free glasses, or were prescribed glasses. After receiving treatment, students who failed the pre-screening progressed significantly faster than those who had passed.

A third study (Streff, Poynter, Jinks, & Wolff, 1990) followed kindergartners in an Ohio parochial school who were offered eyeglasses along with one hour of vision therapy and two half-hour visually based classes each week and compared them to matched students at a similar school in a neighboring town. Students in the treatment group scored similarly on math and IQ tests in September, but statistically significantly higher by April.

Beyond the three trials, a wide range of literature has linked vision and academic performance (Maples, 2003).

Theory. The link between vision and achievement is both logical – if one cannot see, they cannot read written words – and well-supported.

Policy malleability. Conceptually, ensuring that all students who need eyeglasses actually have them is straightforward. Logistically, though, such an initiative would pose more challenges: administering eye tests, delivering eyeglasses, ensuring students wear them, and so forth. And many of the interventions discussed above include vision therapy as well. Schools could likely offer this during the school day, but would have to be convinced that it is worth students missing class to do so.

Summary. The link between changes in vision and changes in achievement is probably better documented than any other factor/condition likely to be affected by social policy and it is a reasonably easy problem to address. Overall, I rate vision thusly:

Empirical Evidence: 3

Theory: 3

Policy Malleability: 2

Total: 8

Recommendations for research, policy, and practice. The potential impacts of such interventions are limited because they do not directly impact those with no vision problems, but vision improvement interventions offer the most straightforward path through which social policy can narrow

the achievement gap. Researchers should focus on the specific logistics of vision interventions (which types of therapy work best and how to get kids to wear their glasses) while policymakers and practitioners should absolutely implement interventions designed to ameliorate vision problems.

Stress. Another health problem frequently considered during daily life but not as often in discussions of education policy is stress.

Links to poverty. Decades of research have explored the ways in which living in poverty increases stress (see, for example: Aneshensel, 2010; D. C. Glass & Singer, 1972). Among other factors, lower-income children experience more stress because they: experience more negative life events (McLoyd, 1990); are exposed to more violence (Foster & Brooks-Gunn, 2009), crime (Goldmann, et al., 2011) and disorder (Hill, et al., 2009); have less residential stability and are more likely to be homeless or have high mobility (Banyard & Graham-Bermann, 1998); live amidst more physical deterioration and in lower quality housing (Evans, Saltzman, & Cooperman, 2001); reside in noisier, more crowded (Evans & English, 2002), and more polluted (Evans & Kantrowitz, 2002) areas; experience more family disruption (McLanahan, 1985); and possess fewer resources with which to combat problems (Banerjee & Mullainathan, 2008). Recent studies have found that children who spent less time in poverty had both experienced less stress (Evans & Kim, 2007) and exhibited better working memory as a result (Evans & Schamberg, 2009).

Empirical evidence. This increased stress impacts academic performance in numerous ways. One study found that children who experienced more negative life events perceived lower self-competence and earned lower grades (Alva & de los Reyes, 1999). Another found that exposure to violence in the family and community increased PTSD symptoms among children, negatively impacted behavior, and reduced achievement (Thompson & Massat, 2005). A longitudinal analysis of urban elementary school children found that stressful experiences negatively impacted achievement and

increased depression and aggression (Morales & Guerra, 2006). Given the myriad causes of stress, path analyses may be particularly appropriate for analyzing its outcomes: one path analysis found that a variety of stressors at the local level harmed children's long-run physical and mental health, led to more behavioral problems, and increased the odds of both teenage pregnancy and dropping out of school (Wadsworth et al., 2008) while another found that maternal stress led to less maternal warmth, home learning stimulation, and cultural socialization, which decreased math and reading achievement of students entering elementary school (Baker & Iruka, 2013). Together, they offer compelling evidence that stress impacts academic performance.

Theory. Just as a variety of different factors raise stress levels, raised stress levels impact a variety of aspects of children's lives – many of which may subsequently influence academic performance. Research has consistently found negative correlations between stress levels and various types of brain development (National Scientific Council on the Developing Child, 2005), which may be the main pathway for stress to influence academics. Similarly, stress also affects cognitive performance: as bodies adapt to constant stress, they tend to either constantly produce high levels of cortisol (a hormone released by the body to deal with stress) or stop producing much cortisol (i.e. stress-response systems either stay on constant high-alert or become fatigued and no longer respond); in either case, individuals' cortisone reactivity is dulled and students in one study who had experienced more stress exhibited lower cortisol reactivity performed worse on tests of executive function and self-regulation (Blair, Granger, & Peters Razza, 2005). Another study found that students who had experienced more negative life events displayed less self-control as well, a strong predictor of academic success (Duckworth, Kim, & Tsukayama, 2013).

Stress and negative life events also negatively impact home environment and parenting practices (Dodge, Pettit, & Bates, 1994), which impact both the behavior (Conger, Ge, Elder, Lorenz, & Simons, 1994) and adaptability of children (Conger, Patterson, & Ge, 1995) and may make them more

prone to ADHD (Anand & Scalzo, 2000). More cumulative stress exposure also impairs health (Felitti, 2002) and mental health (Ewart & Suchday, 2002).

If stress negatively impacts brain development, cognitive performance, emotional regulation, home environment, parenting, health, and mental health – all of which are related to academic performance – it stands to reason that it also impacts children’s performance in school as a result.

Policy malleability. Unfortunately, just as the causes of stress are complex and numerous, the solutions may be as well. Possibilities include altering environments, increasing support, and providing children with counseling. More social support can help, but may not be enough (Gillock & Reyes, 1999). A natural experiment occurred when an American Indian casino opened, and a large number of mostly poor families began earning income supplements; children’s behavior and symptoms of oppositional defiant disorders subsequently improved, but anxiety and depression did not (Costello, Compton, Keeler, & Angold, 2003). A study of after-school and weekend activities found that students who spent more time in green or natural settings experienced less ADHD (Kuo & Faber Taylor, 2004) and a forthcoming study tracked adults while walking in outdoor, green environments versus other settings and found that those in green environments displayed more mood-enhancing and restorative traits (Aspinall, Mavros, Coyne, & Roe, in press). And a meta-analysis of studies of Mindfulness Based Stress Reduction found that they tend to reduce sleep problems and improve mental health (De Vibe, Bjørndal, Hammerstrøm, Kowalski, & Tipton, 2012).

Summary. Overall, the theoretical evidence that stress impacts achievement is extremely strong and the empirical evidence to support the theory is rapidly accumulating. While altering stress through policy may be difficult, we have had past successes and solid ideas for the future. Overall, I rate stress thusly:

Empirical Evidence: 2

Theory: 3

Policy Malleability: 2

Total: 7

Recommendations for research, policy, and practice. In the end, no one intervention seems likely to dramatically reduce stress – but interventions aimed at altering stress levels may also alter other factors/conditions associated with academics (e.g. health, physical fitness, neighborhood conditions, etc.) and, as such, deserve our attention. Researchers should focus on determining which types of stress affect academic outcomes and how these stressors may be eliminated or overcome while policymakers and practitioners should make stress reduction and coping major goals of interventions designed to narrow the achievement gap.

Teen pregnancy. Teenage pregnancy negatively impacts academic performance in two different ways: it both disrupts the life of the teenager who is pregnant and lowers the odds of success of the child of an unprepared and immature mother (Furstenberg, Brooks-Gunn, & Chase-Lansdale, 1989). This section addresses the former.

Links to poverty. While there is no argument that teen pregnancy is higher among lower-income adolescents, not all would agree that this is *caused* by poverty. There is evidence, however, that teenagers are more likely to become pregnant when their parents are less educated or receive welfare and when they experience more stressful life events independent of other predictors of pregnancy – which are all associated with living in poverty (An, Haveman, & Wolfe, 1993). A seminal book on the topic argues that girls from poor areas see pregnancy as an achievable and aspirational goal while considering many others out of reach (Edin & Kefalas, 2007). A recent study comes to a similar conclusion, arguing that teenage pregnancy is the result of adolescents opting out of the economic mainstream because they perceive themselves as unlikely to advance in society (Kearney & Levine,

2012). Together, they offer considerable reason to believe that poverty does, in fact, causally increase pregnancy among teenagers.

Empirical evidence. The link between teen pregnancy and academic performance is slightly less contentious and less complicated. One article found that becoming pregnant as a teenager decreased the odds of graduating, but not because it reduced the odds of dropping out – rather, it prevented those who had already dropped out from re-enrolling (Upchurch & McCarthy, 1990). A forthcoming study addresses the issue from a different perspective, using state testing and compulsory schooling laws as instruments and finds that decreasing dropout rates and keeping students in school longer actually decreases teenage pregnancy (Marcotte, in press). One review argues that public sentiment toward teenage childbearing is far stronger than the evidence of its ill-effects (Furstenberg, 2003), but a more recent review argues that “the association between nonmarital teen births and educational attainment is well documented” (Basch, 2010, p. 29).

Theory. The theory behind the relationship is straightforward: pregnancy and childbirth consume massive amounts of time and effort, which should make it more difficult for teenagers to attend and pay attention in school.

Policy malleability. Addressing teenage pregnancy may be quite similar to addressing vision problems; both in that it helps a minority of students while not directly affecting most others and in that the outcome is singular and tangible. Reducing – or mitigating the effects of – teenage pregnancy, however, is slightly more complex than improving vision, given the myriad causes and emotional and personal decisions involved. One experiment, however, found that a program designed to address two broad problems of teenagers – pregnancy and school failure – reduced both in addition to behavioral problems (Allen, Philliber, Herrling, & Kuperminc, 1997). Another forthcoming study tracked youth and parents for 4 years and concludes that increasing educational aspirations, family communication, and

school connectedness all reduced the odds of teen pregnancy (Oman et al., in press). Other possible levers include relationship guidance and sex education.

Summary. Overall, empirical evidence that teenage pregnancy negatively impacts academic performance is somewhat lacking, though the theory is straightforward and past interventions have met with some success. Overall, I rate teen pregnancy thusly:

Empirical Evidence: 1

Theory: 2

Policy Malleability: 2

Total: 5

Recommendations and implications for research, policy, and practice. The evidence and theory supporting negative effects of teenage pregnancy in addition to the success of previous interventions makes reducing teenage pregnancy a worthwhile goal, but the deep roots of the problem may be more difficult to address than many realize. Nonetheless, researchers should continue to investigate why teenagers choose to conceive a baby (and why they do so unintentionally) while practitioners and policymakers should make reducing teen pregnancy and/or working with teen mothers a secondary concern of interventions designed to narrow the achievement gap.

Environmental toxins and pollution. Different types of pollution and environmental toxins are often examined individually, but for the purposes of this paper I lump them into one category. Most individual toxins and types of pollution affect children in similar ways and have little evidence examining the relationship between that particular chemical or problem and academic outcomes.

Links to poverty. Much as neighborhoods with more crime, disorder, or noise are less desirable, so are neighborhoods and homes with more environmental toxins and pollution – meaning that prices are lower and residents are more likely to be low-income families (Currie, Davis, Greenstone, & Walker,

2013). Additionally, a lack of resources and political capital means both that environmental hazards are less likely to be addressed in the neighborhoods and homes of low-income residents and that these residents are less able to move to less polluted areas. As a result, low-income children have higher blood lead levels (Zierold & Anderson, 2004) and higher rates of asthma (Akinbami, LaFleur, & Schoendorf, 2002; Rosenbaum, 2008) among other symptoms. These pollutants and toxins impact health and well-being in myriad ways (see, for example: American Academy of Pediatrics Committee on Environmental Health, 2004; Evans & Kantrowitz, 2002).

Evidence. Studies linking environmental toxins and pollution with academic outcomes have mostly focused on lead exposure. A longitudinal study in North Carolina found that exposure to lead during early childhood was associated with lower reading scores years later and that higher rates of exposure were associated with even lower scores (Miranda, Kim, Reiter, Overstreet Galeano, & Maxson, 2009). These results were replicated in a recent study in Massachusetts that examined 10 years of student achievement data (Reyes, 2012). And a working paper examining children near a chemical waste depository in Chile finds that blood lead levels not only significantly reduced achievement in school but also dramatically reduced earnings later in life (Rau, Reyes, & Urzúa, 2013).

Theory. An abundance of evidence supports the theory that a variety of toxins impact academic performance – a review of the evidence on the effects of housing on child development concluded that the strongest evidence linked environmental toxins/hazards to health outcomes (Leventhal & Newman, 2010). This evidence is particularly strong regarding lead exposure; a meta-analysis found that blood lead level significantly lowered IQ (J. Schwartz, 1994) and another paper found that it reduced brain volume (Cecil et al., 2008). One paper estimated that reducing lead exposure had not only increased IQ by between 2 and 5 points on average but that this led to hundreds of millions of dollars of economic gains (Grosse, Matte, Schwartz, & Jackson, 2002). And a seminal paper then found that lead exposure not only lowered IQ but also increased crime – including evidence that reductions in crime in recent

decades were largely due to reductions in lead (particularly from discontinuing the use of leaded gasoline) (Nevin, 2000). This theory was supported by later papers that examined bone lead levels and found that it was positively associated with various antisocial and delinquent behaviors (Dietrich, et al., 2001) and that blood lead levels strongly predicted murder rates over many decades across a number of developed countries (Nevin, 2007).

Research links factors beyond lead with correlates of achievement as well. A review of the evidence on the effects of air pollution in urban areas found that different pollutants increased asthma, decreased lung capacity, caused neurological deficits and neurobehavioral changes, increased hospital admissions, decreased cognitive function and IQ, and generally impaired health and increased mortality (Schwela, 2000). Another review found evidence that air pollution restricts fetal growth and increases the odds of pre-term delivery (Maisonet, et al., 2004). A recent study found that not only did contaminated water disproportionately affect the birth weight and gestation of infants of the least-educated mothers but that the same mothers were also the least likely to move to a different area as a result of these effects (Currie, Zivin, Meckel, Neidell, & Schlenker, 2013). A study of the Harlem Children's Zone's Asthma initiative found that 30% of children were asthmatic (twice the national average) and that a quarter of those students had recently missed school as a result of their asthma. And absences are not confined to Harlem; a review of the literature found strong evidence across 66 studies that asthma increase school absenteeism (Taras & Potts-Datema, 2005). The pathways differ by type of environmental toxin/pollutant, but the resulting effects – particularly including decreased intelligence and school attendance, and increased behavioral problems and health issues provide strong reason to believe that these collectively impact academic performance.

Policy malleability. To date, researchers have focused almost exclusively on lead and asthma when it comes to school outcomes. Nonetheless, the health consequences of other factors provide strong reason to address the issue. Due to the wide range of factors and even wider range of effects,

though, knowing where to start is tough. One option is to address the health outcomes through in-school interventions; a review of the research on school health programs found strong evidence of increased academic performance of programs for asthmatic children, for example (Murray, et al., 2007). Improving housing stock or providing health education are other options – a recent intervention combined residence in a new LEED Platinum certified housing development in the South Bronx with a home-based educational module and saw reduced asthma symptoms and fewer school absences 18 months later (Garland et al., 2013). While different problems are easier to address in different locations, multiple different types of interventions have proven successful and could be replicated in the future.

Summary. Overall, a bevy of evidence supports the idea that environmental toxins and pollutants impact academic performance, and while empirical evidence linking the two is limited policies aimed at addressing the problems have had some success. Overall, I rate pollution and environmental toxins thusly:

Empirical Evidence: 2

Theory: 3

Policy Malleability: 2

Total: 7

Recommendations and implications for research, policy, and practice. Researchers should expand beyond lead and asthma when examining school outcomes and should further investigate the efficacy of altering different living conditions and health services – the elimination of leaded gasoline, for example, seems to have had outsized effects and other environmental changes may provide similar bang for the buck – while policymakers and practitioners should put lead reduction near the top of their list and keep other types of pollution in mind as well.

Discussion. Overall, solid evidence indicates that poverty affects health in myriad ways and that these health outcomes negatively affect the academic performance of low-income children. At the same time, while improving the health of the poorest children enough to allow them to both attend school more frequently and be more attentive in school may be a large step in the right direction, it seems unlikely that this alone would close the achievement gap.

The impact of poverty on health largely stems from four general aspects of life. In no particular order, they are: (a) an inability to afford health insurance and regular health care, which leads to chronic issues; (b) a lack of access to resources that facilitate a healthy lifestyle, which decrease physiological, and neurological functioning; (c) stress-inducing environmental factors, which raise blood pressure, disrupt sleep, and erode health over time; and (d) unhealthy environmental conditions that alter the physiology of the body. Interventions designed to improve the health of low-income children could aim at any or all of these four.

A lack of resources puts regular access to health facilities out of the reach of many families and leads to less prenatal care and more undiagnosed vision problems. Expanding health insurance coverage and health care access would go a long way toward solving these problems. A recent study, for example, found that the implementation of SCHIP (which provides health insurance for lower-income children) resulted in higher attendance rates in states with wider implementation since the law was enacted in 1997. One caution, however, is that spending on health care alone may not solve the problem if it does not also address the social and environmental causes of health problems. A recent study looked at the ratio of social to health spending across all OECD countries and concluded that those with higher ratios had lower rates of infant mortality, higher life expectancy, and fewer life years lost after controlling for health expenditures and GDP (E. H. Bradley, Elkins, Herrin, & Elbel, 2011). In other words, without social spending to support the work of health care systems, money may be wasted. The same may be true of schools and social spending.

A lack of access to fresh fruits and vegetables, parks, fitness centers, and other assets and resources leads to poorer nutrition, less physical activity and worse fitness, and higher obesity rates. These are tougher issues to solve since eating and exercise habits are influenced by cultural and economic factors (e.g. what they see their friends do and what they can afford) in addition to access to services. Certainly increasing the availability of these types of assets in high-poverty neighborhoods would be a step in the right direction, but would not solve the problem alone. To fully change lifestyle habits will take more than just easier access to assets that promote a healthier lifestyle. Interventions that make healthier eating more affordable may nudge people in the right direction as well, but community-driven efforts are likely needed to increase participation in fitness programs, cooking classes, and so on in order to significantly alter eating and exercise habits.

Stressors may be even tougher to address. No single intervention will address the majority of stressors in a home or neighborhood. To date, we lack evidence that addressing any single stressor will have larger effects than addressing others on the lengthy list. The easiest place to start would be to try and reduce violence, disorder, crime, physical decay, and other environmental sources of stress. Social causes of stress – everything from gangs to social networks to family disruptions – are likely harder to address though may be more important.

Finally, reducing pollution and environmental toxins is not difficult in theory but may be very difficult politically or economically. The tangibility and easy measurement of many pollution and toxin levels makes them ripe for intervention, but we lack detail on precisely which pollutants and toxins would yield the largest efficiencies. The educational research concentrates on lead and on asthma resulting from various air pollutants, which may be good places to start.

Perhaps more so than in other areas, health issues tend to have strong negative effects on small segments of the population and near-zero impacts on the rest. Few children have serious enough problems with vision, fitness, nutrition, asthma, or another issue to dramatically impact their

achievement. For those who do suffer, however, a pair of glasses, a contraceptive, or a vitamin supplement might make the difference. And, collectively, all the factors above likely contribute significantly to the achievement gap (Currie's (2005) estimate that health problems caused 25% of the achievement gap excluded some of the factors above).

The strongest evidence of the factors reviewed above is that stress and prenatal care impact performance in school, but there is also strong evidence that nutrition, fitness, and mental health impact performance and that environmental toxins and pollutants impact a myriad of behaviors and traits related to academic performance. Vision problems and teenage pregnancy also certainly reduce academic performance, but are more confined problems that impact smaller numbers of students. All are worth addressing as part of an intervention designed to improve living conditions of low-income children.

Vision is the easiest of all of these to address – simply providing somebody with a pair of glasses can often solve the problem – while stress is likely the hardest since the causes are so numerous. And prenatal care seems to offer the best combination of strong effects and malleability through policy intervention. Promise Neighborhoods and other social interventions should aim to act on as many of the factors above as possible, but if a policymaker or practitioner had to choose only one thing it should probably be prenatal care. Stress is at least as important to address, but can be addressed in concert with efforts to improve various neighborhood and home conditions.

Overall, this evaluation of the empirical evidence, theory, and policy malleability find strong support that policy aimed at nutrition, physical fitness, vision, stress, prenatal care, and environmental toxins/pollution can narrow the achievement gap and merit direct attention; moderate evidence that policy aimed at mental health and teen pregnancy can do the same and merit secondary consideration; and little evidence that obesity should receive significant individual attention.

Family and Home Environment

Seymour Martin Lipset, a fellow at the Hoover Institute, was overheard summarizing the results of the Coleman Report to Senator Daniel Patrick Moynihan thusly: "Guess what Coleman's found? Schools make no difference; families make the difference" (quoted in Gamoran & Long, 2006).

While the statement somewhat misinterpreted the findings of the report, the family may indeed be the most important factor in predicting achievement of children. One comprehensive study in Canada (Boyle, Georgiades, Racine, & Mustard, 2007) estimated that over one-third of variance in educational attainment is due to measurable variation in family differences.

And family life can have spillover effects on other kids as well. One study estimated that attending school with children of single parents has a larger negative effect on other kids than does attending school with low-achieving students (Carl & Caldas, 1998), arguing that peer effects mostly stem from home and family conditions.

That family life would correlate so highly with academic performance should surprise no one. Every parent operates under the assumption that the environment they create at home will influence the success of their child later in life. Less clear are the links between social policy and family life – in other words, what can policymakers do that will meaningfully impact how families operate?

In the following pages I review the evidence and theory linking multiple family and home factors with poverty and with academic performance and discuss the implications for both researchers and practitioners and policymakers.

Home Environment. When examining family and home influences on academic performance, researchers tend to focus most on the environment inside the home and parenting style.

Links to poverty. The links between poverty and home environment may not be obvious, but multiple pathways exist. Living in higher-quality housing in a calmer, quieter neighborhood may impact

the environment inside the home – eventually, less chaos outside the house may lead to less chaos inside it (or vice-versa). Multiple studies have established a relationship between neighborhood conditions and parenting style (Leventhal & Brooks-Gunn, 2003) and have found that neighborhood poverty influences home environment (Klebanov, et al., 1994) – even net of a wide range of parental characteristics (Klebanov, Brooks-Gunn, Chase-Landsdale, & Gordon, 1997). Higher-poverty households tend to score lower on measures of home environment (Garrett, Ng'andu, & Ferron, 1994), in part due to more crowding (R. H. Bradley & Caldwell, 1984). And a study of mediators between income and income stability and the achievement of 3-5 year-olds found that higher incomes helped families provide more stimulating learning environments as a result of their increased purchasing power (Yeung, Linver, & Brooks-Gunn, 2002). Between the influences of neighborhood conditions, housing conditions, and income restrictions, living in poverty can affect home environment in a variety of ways.

Empirical evidence. Numerous studies have also found relationships between home environment and academic performance. A longitudinal study (R. H. Bradley, Caldwell, & Rock, 1988) looked at the same group of kids both when they were infants and 10 or 11 years old and found that the home environment at both ages was associated with the children's academic performance. A study of the predictors of home environment found that mothers who delayed childbirth and had higher intelligence and self-esteem levels provided better home environments net of income and other factors, but also that home environment in both pre-school and elementary school concurrently predicted achievement net of all of these factors (Baharudin & Luster, 1998). A study of the Black-White achievement gap found gaps of 9-17 points controlling for demographic factors, but the gaps were reduced to 4-13 points after controlling for home environment (Brooks-Gunn, Klebanov, Smith, Duncan, & Lee, 2003). And a study of twins adopted by different sets of parents found that family environment predicted children's reading ability (Petrill, Deater-Deckard, Schatschneider, & Davis, 2005). In short,

multiple researchers over a number of years using a variety of samples and methods have all found that home environment influences the achievement of students and widens the achievement gap.

Theory. Just as poverty influences home environment in numerous ways, home environment can influence academic performance in myriad ways. The most obvious is through changes in cognitive function; decades of research have correlated family and home environment with intelligence (See, for example: Nisbet, 1961; Sameroff, Seifer, Barocas, Zax, & Greenspan, 1987). The other main branch of research on home environment studies its effect on behavior. For example, a longitudinal paper in New Zealand found that a group of adolescents displaying multiple behavior problems were mostly raised in disorganized and dysfunctional home environments (Fergusson, Horwood, & Lynskey, 1994). Researchers also focus on home chaos, a subset of environment; a study in England found that household chaos predicted behavioral problems in children over and above the influence of parenting practices (Coldwell, Pike, & Dunn, 2006) and a study of adopted twins found that household chaos predicted cognitive ability net of genetic and SES influences (S. A. Hart, Petrill, Deater-Deckard, & Thompson, 2007). Additionally, a longitudinal study of same-sex twins found that household chaos predicted both behavioral problems and IQ concurrently and longitudinally (Deater-Deckard et al., 2009). And a recent study found that an organized and clean home reduced the odds of a child displaying externalizing behaviors – which are frequently caused by parental abuse (Price, Chiapa, & Walsh, 2013). If home environment and chaos impact cognitive function, behavior, and mental health, the findings that they also impact academic performance make perfect sense.

Policy malleability. The difficulty for those designing and implementing policy, however, is figuring out how to change home environments. If income, neighborhoods, and parenting practices influence home environment, they should start there. One study finds that improved family income has strong positive effects on home environment for children born into poverty (Garrett, et al., 1994). But a recent review of seven randomized control trials of parenting interventions found that treatment group

children showed no gain in cognitive development across all of the studies (S. Miller, Maguire, & Macdonald, 2012). Interventions designed to improve income and neighborhoods would aim to change a lot more than home environment, but that should be one important outcome of such an intervention.

Summary. Overall, the empirical evidence and theory supporting the relationship between home environment and academic performance are very strong and we have a fair amount of evidence that policy can change home environment. Overall, I rate home environment thusly:

Empirical Evidence: 3

Theory: 3

Policy Malleability: 2

Total: 8

Recommendations for research, policy, and practice. Given the strong evidence, researchers should continue to investigate how we can change home environments while policymakers and practitioners should make home environment a top priority of interventions designed to narrow the achievement gap.

Parenting style. One major driver of home environment is parenting practices.

Links to poverty. In addition to differing home environments, parents of different classes tend to utilize different parenting strategies – though many of these may be beyond the scope of all but the most intensive and interventionist of policy. How, exactly, poverty influences parenting styles, however, is up for debate. One pathway is the social environment in which families live. In a seminal work, Lareau (2000, 2003) found that middle-class parents tended to make a concerted effort to cultivate their children by scheduling them for a myriad of activities and constantly checking on them while working-class parents tended to let their children find their own way and grow naturally, which she attributes to both social norms and parents' workplace environments. And another longitudinal study found that

neighborhood culture and context influenced warmth and harsh interactions among parents in high-risk communities (Pinderhughes, Nix, Foster, & Damon, 2001).

Another pathway is stress. A review of the research found that poverty diminished the emotional capacity of parents as a result of hardship and psychological distress stemming from negative life events (McLoyd, 1990). And a study of mediators between income stability and the achievement of 3-5 year-olds found that income stability led to less emotional distress, different parenting practices, and, ultimately, fewer behavioral problems (Yeung, et al., 2002). Social relationships also likely contribute to parenting differences. One study found that low-income parents were particularly susceptible to the effects of social support and were more punitive when they felt less supported (Hashima & Amato, 1994) and another study of parenting and home environment found both that family poverty negatively affected social support and that neighborhood poverty reduced maternal warmth (Klebanov, et al., 1994).

Another theory is that those living in high-poverty neighborhoods (which also have higher rates of violence and crime) are more likely to associate with peers with significant behavioral problems. Indeed, one study of 10-13 year-olds in Georgia and Iowa found that parents were more inconsistent and resorted to harsher parenting techniques when they perceived that their child was socializing with deviant peers (Brody et al., 2001) and other studies have found that socioeconomic disadvantage increased the use of harsh, inconsistent parenting (McLoyd, 1998).

Empirical evidence. Parenting, perhaps not surprisingly, also influences academic performance. One study of parenting style found that the least educated parents were the most likely to use authoritarian or permissive parenting styles – which were negatively associated with grades, controlling for parental education and other factors – while more educated parents were more likely to use authoritative parenting styles, which were positively associated with grades (Dornbusch, Ritter, Leiderman, Roberts, & Fraleigh, 1987). Yeung & Conley (2008) found one measure of home

environment -- parental warmth -- to be positively associated with achievement, even when controlling for a bevy of other factors. A longitudinal study of Baltimore youth found that social context at age 6 predicted outcomes at age 22 as well as did later measures and that parental psychological support was a strong predictor of achievement at age 6 (Entwisle, Alexander, & Olson, 2005).

Theory. The theoretical support for a relationship between parenting and academic performance is vast, but is straightforward enough that a full review is unnecessary to convey the main points. Studies of parenting have found that material hardship increased parental stress, decreased positive parenting, and decreased cognitive skills and social-emotional competence (Gershoff, Aber, Raver, & Lennon, 2007). The relationships, norms, and boundaries established by parents play a large role in child development; when children develop cognitively, socially, and emotionally, they experience more success in school.

Policy malleability. Changing parenting styles, however, poses quite a challenge. Certainly reducing material disadvantage, negative events, and stress should alter parenting, but may require large-scale interventions. Smaller-scale interventions may aim at changing neighborhood social and cultural norms or educating parents regarding the effectiveness of various techniques. The latter, however, likely requires ongoing support. Parenting requires constant in-the-moment reactions and even the best parents revert to base instincts and the methods their own parents used in times of stress.

Summary. The research on parenting and education deserves far more than this brief overview, but there is strong evidence that poverty affects parenting in a wide variety of ways and nobody really doubts that parenting strongly influences child development and academic performance, though is likely very difficult to change through policy. Overall, I rate parenting styles thusly:

Empirical Evidence: 3

Theory: 3

Policy Malleability: 1

Total: 7

Recommendations for research, policy, and practice. The challenge for researchers here is not establishing that parenting matters but, rather, discerning exactly what aspects of parenting matter in what ways; they should continue to investigate how a wide range of parenting practices affect success in school. And the challenge for policymakers and practitioners is determining how to alter parenting techniques; they should proceed with caution given the difficulty of the task but should nonetheless put parenting style near the top of their list.

Language exposure. One aspect of parenting and home environment that bears special mention is the exposure to language of young children.

Links to poverty. In one oft-cited study (B. Hart & Risley, 1995), researchers found that young children from upper-class homes heard millions of more words than did their lower-class peers and that, subsequently, they had a much larger vocabulary. Other studies have found that child-directed speech (Hoff-Ginsberg, 1991) and subsequent vocabulary growth weeks (Hoff, 2003) and years later (Rowe, 2008) differed significantly between working-class and middle-class families. Another reason for the differences is that lower-income families live in more crowded homes and parents in more crowded environments tend to speak in less complex, sophisticated ways (Evans, et al., 1999). We would naturally expect these vocabulary differences to morph into differences in a wider range of cognitive performance.

Empirical evidence. One study found that higher-SES parents not only increased language learning in very young children but that these children had higher IQs and verbal ability 10 years later (Walker, Greenwood, Hart, & Carta, 1994). A meta-analysis of the effects of parent-preschooler reading

found that frequency of book reading explained about 8% of the variance in language growth, emergent literacy, and reading achievement (Bus, van IJzendoorn, & Pellegrini, 1995).

Theory. Much like parenting style, nobody really doubts that language exposure and vocabulary growth are related and affect academic performance.

Policy malleability. The situation also presents similar challenges to practitioners and policymakers. Indeed, many find it hard to imagine a feasible and scalable policy that would dramatically increase the number of words spoken to toddlers by their parents. Various local educational efforts are underway, but it remains unlikely that a large-scale federal intervention would do much. One possibility that bears mentioning, however, is a pilot study that uses linguistic feedback devices to inform parents how many words were spoken with their child – after one educational session, non-parental caregivers increased words spoken per hour by 31% when using the device (Suskind et al., 2013). Whether or not it would work with parents over long periods of time, though, remains to be seen.

Summary. Though more research could always strengthen the case, little doubt exists regarding the evidence or theory backing the potential impact of increasing language exposure. The lone weakness is its lack of policy malleability. Overall, I rate language exposure thusly:

Empirical Evidence: 3

Theory: 3

Policy Malleability: 1

Total: 7

Recommendations for research, policy, and practice. Given the compelling evidence that language exposure has profound long-term effects, researchers should study interventions designed to increase language exposure and vocabulary growth in young kids while practitioners and policymakers should make language development a major focus.

Discussion. The research on home environment, parenting styles, and language exposure offers strong empirical evidence and compelling reason to believe that all three significantly affect children's performance in school. The links between poverty and these family/home characteristics, however, are more complex. The three main causes discussed in the literature are stress, lack of resources, and social/cultural context.

Perhaps the strongest evidence is that stress negatively impacts parenting and home environment. Negative life events – perhaps events that landed the family in poverty – including more violent and chaotic neighborhoods and worse housing conditions raise stress in ways that affect health (as discussed above) and academic performance. One of the major mediators between stress and academic performance is likely the reaction of parents to this stress. A number of studies link increased stress with more hostility, anger, punitive actions, and worse parent-child relationships. Anger and frustration are natural reactions to stress, so it only makes sense that children of stressed-out parents would experience these more frequently. The result is that children feel less supported by their parents, experience a more negative and chaotic home environment, and experience more social-emotional problems. All of these impact the degree to which children can focus in school and on schoolwork in addition to their general behavior and health.

Families living in poverty also have fewer resources to stimulate and support their children. Toys, books, games, and so on all cost money. And lower-income families are squeezed into smaller living spaces that hinder parenting and the formation of positive home environments. Few would argue, however, that simply providing parents with these resources would close the parenting gap. While decreasing crowdedness may be cost prohibitive, providing selected resources may be cost-effective interventions. Few would advocate a program to re-do the interiors of every low-income family's home,

but it may be possible to provide kids with a few more books, internet access, or a few games that spur development relatively cheaply and easily.

Perhaps the largest, and hardest to change, influence on parenting and home environment is the social and cultural context in which the family lives. It is conventional wisdom that new parents turn into their own parents once they have children of their own. In education, the adage goes that teachers teach the way they were taught rather than the way they were taught to teach. In other words, when push comes to shove, people (parents and teachers included) tend to resort to what they know rather than doing what they think is right. In this sense, breaking generations of tradition and technique may be particularly difficult. Additionally, the social and cultural norms to which parents and children are exposed in their neighborhoods, institutions, and social circles likely exert more influence on parenting techniques than do any parenting manuals. On the one hand, parenting is unlikely to dramatically change without first altering social and cultural norms and context but, on the other, this likely takes *intensive* intervention.

Overall, intervening in family and home life in order to narrow the achievement gap makes a whole lot of sense. Family likely influences achievement more than health or neighborhoods do independently. But changing parenting and home environments offer daunting challenges to practitioners and policymakers. In order to know which interventions offer the best chance of success, researchers should focus on unraveling the complex relationships between family, home, parenting, and academics and point the way toward both specific factors that matter (e.g. language exposure) and policy changes likely to change these factors. Policymakers and practitioners, meanwhile, cannot afford to wait for a decade of focused research before acting; home environment, parenting practices, and language exposure should be near the top of the agenda when we create and implement policy and interventions designed to narrow the achievement gap.

Discussion

This paper offers brief overviews of the evidence and theory linking poverty with a wide range of environmental conditions and social factors and these conditions/factors with children's academic performance. All of these factors/conditions merit significantly more in-depth investigation – both regarding the evidence and theory linking them with poverty and with academic performance and regarding the ability of social policy to effectively alter them in ways that will narrow the achievement gap.

Overall, the theory and evidence are strong that these myriad factors/conditions mediate the relationship between poverty and academic performance. They offer significant insight into why low-SES children perform so much worse in school and offer suggestive evidence regarding strategies we might utilize to narrow the achievement gap between classes. 12 of the 21 factors are rated as having strong evidence that policy aimed at changing them will narrow the achievement gap, an additional 7 are rated as moderately strong, and only 2 are rated as weak (see Table 5).

[Insert Table 5 Here]

The fact that 19 of the 21 factors/conditions discussed seem to be at least moderately strongly related to performance, though, speaks volumes – especially since many of them could be broken down into smaller sub-categories (nutrition or parenting style, for example, could easily contain 10 sub-factors each).

That so many factors/conditions influence academic performance strongly indicates that no one thing is *that* important. Clearly, none of these factors/conditions are sufficient to create a good student and, in fact, none of them are probably even necessary. In short, nothing matters because everything matters.

Table 5: Results of Evaluations of Individual Factors/Conditions

	Factor/Condition	Empirical Evidence	Theory	Policy Malleability	Total
<i>Strong Evidence</i>	Vision	3	3	2	8
	Home Environment	3	3	2	8
	Violence/Crime	2	3	2	7
	Homeownership	2	3	2	7
	Mobility/Homelessness	2	3	2	7
	Nutrition	2	3	2	7
	Physical Fitness	2	3	2	7
	Stress	2	3	2	7
	Environmental Toxins/Pollution	2	3	2	7
	Prenatal Care	2	3	2	7
	Parenting Styles	3	3	1	7
Language Exposure	3	3	1	7	
<i>Moderate Evidence</i>	Physical Conditions	2	2	2	6
	Mental Health	2	2	2	6
	Noise	1	2	2	5
	Teen Pregnancy	1	2	2	5
	Disorder	1	3	1	5
	Social Organization	1	3	1	5
	Crowding	1	2	1	4
<i>Weak Evidence</i>	Public Housing	0	1	2	3
	Obesity	1	1	1	3
	<i>Average</i>	<i>1.81</i>	<i>2.57</i>	<i>1.71</i>	

As such, pursuing policies that aim to alter only one of the factors/conditions discussed above borders on silly if the goal is to significantly narrow the achievement gap. A wide range of factors and conditions need to be addressed before that is likely to happen. That leaves us with two options if we wish to use social policy to narrow achievement gaps: design comprehensive policies that address a myriad of issues or coordinate efforts between groups that are all making concerted efforts to address one specific issue.

Lastly, while 19 of the above offer evidence and theory compelling enough to merit significantly deeper investigation, in-depth investigations into each of these factors are outside the scope of this paper. Subsequent research should more fully the research and theory on two of the factors discussed above that (a) seem particularly likely to impact performance; (b) lack a recent or comprehensive review or synthesis of the literature; and (c) are particularly likely to be policy actionable; and (e.) tie in with a large number of factors/conditions above.

Unresolved Questions

Gaps in Evidence

While the research is voluminous, most questions remain unanswered. As I discuss throughout the dissertation, research on social factors and environmental conditions focuses heavily on non-academic outcomes – which poses the largest barrier to figuring out what matters and how we should try to effect change. But two other major gaps exist.

Policy effects. The primary question left unanswered by the research is the degree to which policy can elicit changes in these factors/conditions that will then yield changes in academic performance. The research primarily investigates contemporaneous relationships between

factors/conditions and outcomes, but rarely investigates whether changing a factor/condition will subsequently change outcomes – yet alone whether policy can actually alter that factor/condition.

Interaction between factors/conditions. Many of the factors and conditions discussed in this dissertation influence each other in addition to child outcomes. For example, disorder, crime, and social organization of neighborhoods all interact with each other and are probably influenced by homeownership and subsequently influence stress levels. To really understand which mediators need to be addressed, we need to understand the interaction effects of different mediators.

Currently, research mostly examines whether one factor/condition affects child outcomes independent of the influence of other factors and conditions. This is helpful when envisioning which might have the largest effects, but out of line with the way the real world operates. If somebody wants to be healthy, for example, they cannot accomplish their goal only by brushing their teeth or eating apples. Rather, we need to know how oral hygiene, fruit consumption, and other factors interact and accumulate to affect one's health.

Gaps in Theory

The theory supporting social intervention is stronger than the evidence. Given what we know about how and when the achievement gap is formed, what influences academic outcomes, and how environmental conditions and social factors influence a wide array of child outcomes, one can make a strong case for the merits of social intervention. When examining empirical evidence, though, two gaps in theory stand out.

Understanding family preferences. We need to better understand the preferences of the families affected by policies and keep in mind that the people we aim to help do not always share the

same goals for themselves as we do for them. For example, even though moving to a higher-income neighborhood seems like a good idea from afar, many people moved away from their new lower-poverty neighborhood after confronting issues with isolation, landlords, and other issues in Gautreaux (Boyd, Edin, Clampet-Lundquist, & Duncan, 2010) and sacrificed neighborhood quality for housing quality when making subsequent moves in the Moving to Opportunity experiment (Rosenblatt & DeLuca, 2012).

Similarly, when the gang-infested, crime-riddled, dilapidated public housing towers were demolished in Chicago, it was largely seen as a win for both the city and the residents of these towers. But the reality is that many of the residents had deep ties in the developments – regardless of how they might appear to outsiders (Venkatesh, 2008), which then affected whether or not they returned post-demolition (Joseph & Chaskin, 2012).

A study of randomly assigned housing vouchers in Yonkers found that residents who moved to low-poverty neighborhood were less likely to socialize informally with their neighbors (Fauth, Leventhal, & Brooks-Gunn, 2004), which could partly explain both dissatisfaction with low-income neighborhoods and some tepid empirical results. Another study hints at one potential solution: finding that people who moved into HOPE VI neighborhoods had the highest levels of social capital when neighborhood resources were plentiful (Curley, 2010b).

Whether and to what extent people are willing and able to buy into a program will certainly affect the program's success. Understanding what makes people willing and able to engage can help design better policy – this may be particularly important in mixed-income developments, which often count on social interaction between neighbors to provide a higher quality of life (Joseph, 2006).

Educational researchers should be familiar with this problem since “implementation fidelity” is a major problem in school research – teachers and principal routinely ignore, misunderstand, or disagree with new curricula, pedagogies, etc. – which limits the impact of many interventions. Similarly, if

families have different goals, desires, or perceptions than those designing interventions and creating policy, they will almost certainly react in unexpected ways – preventing policies from achieving their goals. This is often cited when diagnosing the failure of an intervention, but not fully incorporated into theory regarding the effects of poverty or the ability of policy to mitigate these effects.

Institutions. Though institutions have been widely studied for centuries, virtually none of the studies cited in this dissertation discuss the influence of institutions on either children’s academic performance or the factor/condition being studied.

The institutions present in a neighborhood almost certainly affect both the objective conditions of the neighborhood – for example, more bars and fewer recreation centers are associated with increased crime in high-poverty neighborhoods in Columbus, Ohio (Peterson, Krivo, & Harris, 2000) – in addition to the way that families and children experience these conditions.

The presence and utilization of churches, schools, community centers, police stations, health clinics, social service agencies, social clubs, recreational facilities, athletic teams, and other institutions should be more prominently considered by researchers both when examining the observable traits of neighborhoods, homes, health, and family interactions and when examining the ways in which these observable traits influence children.

Conclusion

While the evidence that social policy *has* impacted educational outcomes is scarce, the evidence and theory linking environmental factors and social conditions with academic outcomes offer a compelling case that interventions *should* be able to help. Which is why, in a recent APPAM Presidential address, Ladd (2012) called on her colleagues to eliminate No Child Left Behind and focus instead on addressing the problems confronted by low-SES students.

Education policy this century has focused mainly on reforming and replacing ineffective schools and teachers through accountability, choice, and competition. But as No Child Left Behind declares more and more schools “in need of improvement” while benchmarks rise toward an unreachable goal, it seems that attitudes may be shifting. Indeed, the past decade has seen more calls to address poverty itself, kick-started by the seminal work of Rothstein (2004), spurred by the formation of the “Broader, Bolder Coalition,” and now culminating in the creation of dozens of Promise Neighborhoods around the country.

Overall, based on the research presented in this dissertation, a fair conclusion is that we have strong reason to believe that social policy *can* work but little evidence that it actually *has* or necessarily *will*. But if we wait for strong evidence before proceeding with new ideas, those ideas will never be tested. Given the breadth and depth of the research, the failure of recent policy, and the significance of the problem, it seems the only responsible course of action is to focus significant efforts on learning whether, how, and when social policy can work to narrow the achievement gap.

This paper asks more questions than it answers. We know far less about the ability of social policy to mitigate the influence of poverty on academic performance than we need to know in order to significantly narrow the achievement gap. Nevertheless, we know enough to both design better policy and ask better questions in the future.

Overall, we have plenty of reason to believe that social policy can be effective but little evidence proving that is *has* or necessarily *will* – largely because academic outcomes simply have not been part of most studies of social policy. The mixed evidence and strong theory combined with the lack of success of current policies, though, dictate that we follow our intuition and explore how and whether social policy can significantly narrow the achievement gap.

We have evidence that children living in poverty experience a wide range of environmental conditions and social factors negatively impact their academic performance. This provides us a clearer

picture of one major way in which poverty impacts performance that nudges us toward an understanding of the causal effects of poverty on academics.

It also provides enough information to facilitate a broad research agenda that explores how these different factors/conditions collectively affect children, which children they affect, and how policy can change them.

Lastly, it provides practitioners and policymakers with a framework with which to work when designing policy and implementing interventions. A crucial question for Promise Neighborhoods and other interventions is what they should seek to change, and I provide a list of 19 factors/conditions with varying degrees of empirical and theoretical support in addition to a thorough review and discussion of the ways in which homeownership and stress both interact with the other 17 and directly affect students alone.

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