Winter | '14

Understanding Summer Learning Loss

Why low-income children need effective summer programming

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I. Introduction

At the beginning of June, millions of children across the country stream out of the doors of their elementary, middle, and high schools and into the wonderful, homework-free 2 ½ month vacation that is summer break. For many children, summer is a time of exciting trips, engaging and fun summer enrichment programs that keep academic skills in top shape without feeling like a tedious classroom environment, and chances to explore new hobbies and activities. For other children, however, summer is a time of boredom, little to no academic stimulation or enrichment, and a loss of meals, resources, and stability provided by school systems. A slip in academic skills over the summer has long been proven to occur, but this paper seeks to collect and examine the evidence regarding the impact of summer vacation on children from different socio-economic backgrounds. After conclusive evidence about the summer learning gap is presented, potential causal mechanisms behind summer learning loss are examined, before a synthesis of summer programs is used to inform policy recommendations that aim to narrow the achievement gap between low and high SES students.

The importance of narrowing the achievement gap is informed by Rawls' theory of fair equality of opportunity. According to Rawls, social circumstances and determinants play a large role in an individual's life outcomes, and society is morally obligated to pay attention to the differences that resulted from a social lottery. It is not enough to merely provide equal access to opportunities, but rather individuals must be equipped with the necessary tools to take advantage of opportunities[1]. If summer break affects the children of low versus high-income families

[1] Daniels, Norman. *Just Health: Meeting Health Needs Fairly.* New York: Cambridge University Press, 2008.

differently, can we fulfill our duty by providing high quality summer programming? This question, along with many others, will be explored below.

II. Characterizing the Problem

The Evidence

There is no question that the state of public education in the United States has been at the forefront of the policy agenda over the past several decades. While opinions differ on what has been accomplished to actually improve educational attainment and achievement for our nation's children, there has certainly been a boom in research and analysis of the specific factors that might be blocking the road to success for students. While attention has been given to everything from teacher quality, to classroom size, to school resources, to early childhood interventions, many are beginning to tout the school calendar as a significant barrier to achievement for children. The synthesis of past and recent data has allowed researchers to pinpoint exactly how much learning loss happens during the 2 ½ to 3-month halt in formal learning over the summer, and how children from different socioeconomic backgrounds are disproportionately affected. This section of the paper presents the data on achievement losses during the summer, examines a number of mechanisms that could explain this summer slide, and documents the long-term consequences of the summer learning gap.

The achievement gap between children of different socio-economic statuses has been well documented in the United States. Evidence shows that by first grade, higher SES students are already performing at noticeably higher levels than their lower SES counterparts[2]. Research has been done to attempt to explain the achievement gap from every angle, and an interest in the

[2] Karl L. Alexander, Doris R. Entwisle, and Linda S. Olson. "Schools, Achievement, and Inequality: A Seasonal Perspective." *Educational Evaluation and Policy Analysis* 23.2 (2001): 171-172

formal school calendar as a possible explanation to the perpetuation of the achievement gap began as early as the turn of the 20th century[3]. However, there has been little standardization across these studies, which makes it hard to draw broad conclusions from the data. In order to ensure proper analysis, measurements must remain constant regarding things like the specific length of the summer break and how the achievement scores are measured. School calendars vary slightly, as do testing schedules, meaning that some children may go a few weeks longer or shorter than others before being tested, thus allowing for a larger loss of skills or a few weeks of review in the early weeks of a new school term. This can affect achievement scores, and cloud what really happens to children over the summer. Figure 1, below, shows a hypothetical graph of how a 3-week difference in when standardized tests occur can almost completely mask summer learning loss. The dashed line represents students' learning during summer break and slightly before and after. Right after school ends, students are still on the upward learning trajectory, but then that drops off over summer and rebounds slightly as school begins in the fall. The solid line represents what happens if three weeks of instruction occur before, after, and between the fall and spring achievement tests.

In addition to the importance of a standardized spring and fall achievement test schedule, it is vital to note the differential impacts summer break has on reading and language skills versus math skills. Figure 2 summarizes the data on summer learning loss before 1973, showing the studies that recorded gains and losses for math computation, math concepts, reading comprehension, spelling, and other languages and subjects. It is clear that math computation

[3] Harris Cooper, Barbara Nye, Kelly Charlton, James Lindsay, and Scott Greathouse. "The Effects of Summer Vacation on Achievement Test Scores: A Narrative and Meta-Analytic Review." *American Educational Research Association* 66.3 (1996): 233

suffers the most according to pre-1973 studies. The bulk of the children surveyed in these pre-1973 studies were in grades 4 through 9[4].

Figure 1

Cooper, Nye, Charlton, Lindsay, and Greathouse

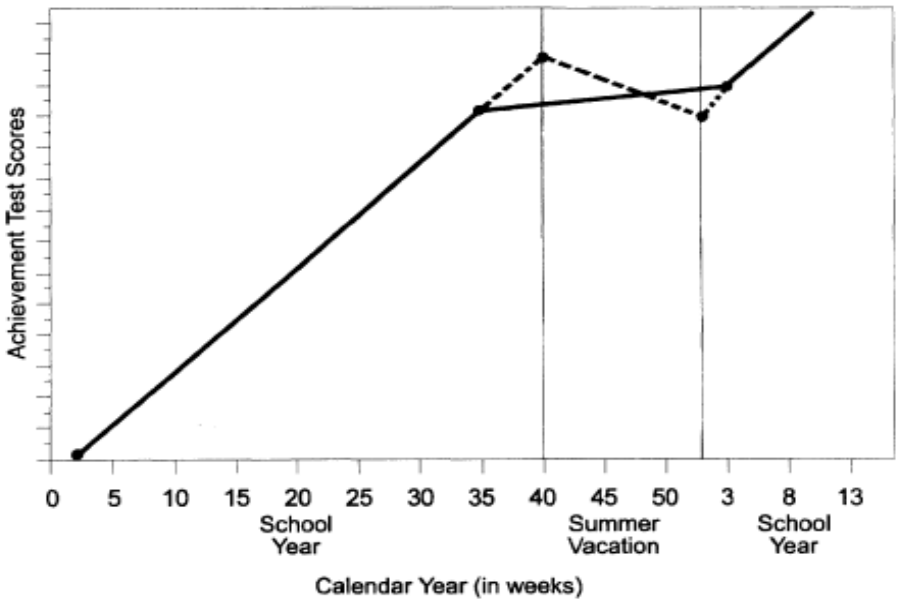

FIGURE 1. *A hypothetical relation between changes in student achievement over summer and spring-to-fall testing intervals*

Figure 2

TABLE 2

Vote-count summary of directional findings of early studies (1906–1973) of summer vacation effects on academic achievement

	Math computation	Math concepts	Reading comprehension	Spelling	Other language	Other subjects	Total
Gain	0	6	10	0	10	6	32
Loss	17	6	7	11	5	2	48
Sign test *p*-level	.0001	ns	ns	.001	ns	ns	.08

Note. There were six tests of summer vacation effects that revealed no effect or pattern.

[4] Cooper, Nye, Charlton, Lindsay, and Greathouse. "The Effects of Summer Vacation on Achievement Test Scores: A Narrative and Meta-Analytic Review," 241

When this pre-1975 data is examined by socio-economic status, there is an interesting difference between high and low SES students. While low SES students show losses in vocabulary and reading skills over the summer, higher SES students tend to show gains in these areas[5]. Thus, if one were looking at the average achievement scores for students, it would appear that summer vacation does not negatively impact reading and vocabulary achievement. Though these early studies often used differing methods and lacked standardization, a rough synthesis of the data collected still presents an interesting hypothesis: that summer vacation affects children from different socio-economic statuses differently.

Since these early studies, researchers have added a significant amount of data and literature to the summer learning loss debate. This topic continues to be driven by the widening achievement gap, and the fact that it is evident so early in life. This means that factors at work in the home affect educational attainment, because 1st grade students haven't been in the school system long enough to have their educational outcomes dramatically shaped by educational institutions. With this evidence on the table, it is logical to explore what happens to children when they are not in school for 3 months out of every year. A 2001 study by Alexander, Entwisle, and Olson revealed interesting data to further the body of literature on summer slide. They used data from the California Achievement Test (CAT), which encompasses achievement test scores for 790 children in Baltimore from the fall of first grade in 1982 through the spring of fifth grade in 1987[6]. The researchers wanted to understand the degree to which factors outside of the school environment could influence the achievement gap. In the sample population, only a

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[5] Ibid.

[6] Alexander, Entwisle, and Olson. "Schools, Achievement, and Inequality: A Seasonal Perspective," 172

few children attended summer school[7]. The children were divided into high, middle, and low SES groups based on a scale made up of three items- mother's and father's education, ranking of occupational status, and whether or not the children received reduced price lunch. About half of the sample fell into the low-income group[8].

The researchers found that winter gains (which the researchers conceived as the 8 month period from October to May, signifying the school year) remained similar for low, middle, and high SES groups. As seen in figure 3, each SES group gained roughly 4 to 5 points per month on the California Achievement Test in reading and math. In the summer, low and middle SES students begin to lose ground in the first few summers, especially in math. We see those losses turn into the slightest of gains in reading by years 3 through 5, ending with a mean gain of .02 per month in reading for low SES children and .44 per month for middle SES children. High SES children improve their score on the CAT reading section by roughly 3.28 points per month during the summer. In math, low SES children see a mean loss of .36 per month, while middle and high SES children see small mean gains of .11 and 1.18, respectively[9]. This data, presented in figure 3, shows a potential reason why the achievement gap is perpetuated.

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[7] Ibid.
[8] Alexander, Entwisle, and Olson. "Schools, Achievement, and Inequality: A Seasonal Perspective," 175
[9] Alexander, Entwisle, and Olson. "Schools, Achievement, and Inequality: A Seasonal Perspective," 177

Figure 3

CAT Achievement Gains by Season and Socioeconomic Level: Five Winters, Four Summers (Restricted Samples, N = 665 [Verbal], 678 [Quantitative])

	CAT-V (Reading)			CAT-M (Math)		
Season	Low SES[a]	Mid SES[a]	High SES[a]	Low SES[a]	Mid SES[a]	High SES[a]
Winter gains						
1st	55.94 (2.64)	69.86 (3.55)	60.09 (3.37)	48.84 (1.64)	53.79 (2.11)	43.71 (2.46)
2nd	46.00 (2.31)	43.19 (3.06)	39.82 (3.50)	42.35 (1.42)	44.06 (2.06)	42.92 (2.22)
3rd	30.46 (2.17)	34.34 (3.48)	34.68 (3.76)	35.50 (1.56)	35.68 (2.27)	35.96 (2.39)
4th	33.57 (2.24)	41.29 (3.15)	28.52 (4.26)	32.94 (1.50)	32.88 (2.49)	34.71 (2.76)
5th	25.28 (2.22)	27.86 (3.37)	23.58 (4.19)	24.35 (1.82)	30.90 (2.72)	26.35 (3.31)
Total gain	191.25	216.54	186.69	183.98	197.31	183.65
Mean gain/ month[b]	4.78	5.41	4.67	4.60	4.93	4.59
Summer gains						
1st	−3.67 (2.49)	−3.11 (3.46)	15.38 (3.05)	−4.89 (1.59)	−8.22 (2.22)	7.18 (2.66)
2nd	−1.70 (2.26)	4.18 (3.60)	9.22 (4.00)	−5.18 (1.67)	−.50 (2.50)	3.14 (2.74)
3rd	2.74 (2.21)	3.68 (3.82)	14.51 (4.33)	−1.25 (1.57)	6.15 (2.74)	2.28 (2.78)
4th	2.89 (2.56)	2.34 (3.21)	13.38 (4.42)	5.50 (1.59)	4.31 (2.67)	6.30 (3.39)
Total gain	.26	7.09	52.49	−5.82	1.74	18.90
Mean gain/ month[b]	.02	.44	3.28	−.36	.11	1.18

Note. Standard errors are reported in parentheses.
CAT, California Achievement Test.
[a] Sample size ranges for seasonal gains: Low SES $N = 264–339$; Mid SES $N = 113–162$; High SES $N = 85–150$.
[b] Based on 8 months of winter (Oct–May), 4 months of summer (June–Sept).

It seems that, "Schooling… mitigates effects of social disadvantage in that children's sizable school-year achievement gains depend much less on home resources than do gains over summer months"[10]. This conclusion dramatically shapes the future of education policy. If the school environment appears to be an equalizer for educational attainment, the emphasis is placed on the family, community, and home life as key factors in differential school achievement across income levels. Though it is important to note that the finding that children learn roughly the same amount in school, regardless of SES, "does not imply parity, or even near equivalence, in access to particular school resources or opportunities to learn, which are often quite unequally

[10] Alexander, Entwisle, and Olson. "Schools, Achievement, and Inequality: A Seasonal Perspective," 174

distributed"[11]. Alexander et. al's conclusion is corroborated on a national level by Heyns (1987) and Karwiet, Ricciuti, and Thompson (1994).

Additional data to inform Alexander et. al's 2001 study is found through a meta-analysis of 13 recent studies on summer slide by Harris Cooper, Barbara Nye, Kelly Charlton, James Lindsay, and Scott Greathouse. The authors' collection of studies (which ranged from the 1970s-1990s) contained data from 47,994 students in grades 1 through 8, and the 13 most recent studies were analyzed to understand the recent data trends in summer learning loss (Cooper et. al, 252). The authors examined the data by a number of factors, focusing on the effect of summer vacation on both math *and* reading test scores. The most significant findings centered on SES, but it is also notable that the negative effect of summer vacation appears to be increasing since the late 20th century[12]. The meta-analysis revealed that children lose approximately one month of grade-level skills during the summer[13]. Cooper et. al found that overall, regardless of SES, the test score loss during the summer was greater for math than reading, and that the subjects that suffered the most were math computation and spelling. When SES is examined, it seems that all students lose math skills, while low SES students lose reading and language skills at a much greater pace than middle/high SES students, creating a 3-month gap between the groups[14].

The authors also introduced controls (in addition to family income) for the type of report (i.e. was the study originally published in a book or a journal vs. an unpublished work such as a thesis or dissertation), length of the testing interval, student gender and race, and student grade

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[11] Alexander, Karl L., Doris R. Entwisle, and Linda Steffel Olson. "Lasting Consequences of the Summer Learning Gap." *American Sociological Review* 72 (2007):168

[12] Cooper, Nye, Charlton, Lindsay, and Greathouse. "The Effects of Summer Vacation on Achievement Test Scores: A Narrative and Meta-Analytic Review," 252

[13] Cooper, Nye, Charlton, Lindsay, and Greathouse. "The Effects of Summer Vacation on Achievement Test Scores: A Narrative and Meta-Analytic Review," 253

[14] Cooper, Nye, Charlton, Lindsay, and Greathouse. "The Effects of Summer Vacation on Achievement Test Scores: A Narrative and Meta-Analytic Review," 261

level. The analysis revealed that type of report and student gender and race did not play a role in influencing the effect of summer vacation. However, when the length of the testing interval is examined, "longer summer intervals were associated with greater gains or lesser losses in relative-metric achievement test scores for both math (χ^2 (1, n=6) =6.31, p<.02) and reading (χ^2 (1, n=29) =14.40, p<.001)"[15]. Regarding grade level, analysis showed that summer learning loss steepens for reading achievement as students get older[16]. A summary of this data is presented in Figure 4 below.

Figure 4

TABLE 9
Average effect of summer vacation on relative reading achievement for different grade levels

	d-index			DGLE		
Grade	No. of samples	Sample size	*M*	No. of samples	Sample size	*M*
1	7	1,967	+.04	4	764	+.06
2	8	2,189	+.04	2	74	+.14
3	6	2,169	–.02	5	1,203	–.12
4	8	2,778	–.12*	6	1,237	–.34
5	11	4,056	–.09*	10	2,690	–.20
6	10	1,212	–.12*	10	1,212	–.18
7	9	642	–.17*	9	642	–.36
8	3	235	–.21*	3	235	–.46

The Long-Run Effects of Summer Learning Loss

While understanding the trajectory of summer learning loss data, and how that perpetuates the achievement gap between low and high SES students is essential, an examination of the long-term consequences of summer learning differences is also critical. Most work has

[15] Cooper, Nye, Charlton, Lindsay, and Greathouse. "The Effects of Summer Vacation on Achievement Test Scores: A Narrative and Meta-Analytic Review," 256
[16] Cooper, Nye, Charlton, Lindsay, and Greathouse. "The Effects of Summer Vacation on Achievement Test Scores: A Narrative and Meta-Analytic Review," 258

focused on dissecting the specifics of summer learning loss year to year, but logic would posit that these year to year effects have even stronger cumulative effects. What long-run outcomes are affected as a result of the seasonal perpetuation of the achievement gap? Based on a substantial body of prominent literature, Karl L. Alexander, Doris R. Entwisle, and Linda Steffel Olson sought to examine the effects of summer learning differences in elementary school on high school and post-high school achievement-based outcomes. Their hypothesis was based on the logic that:

> (1) if the achievement gap by family SES during the elementary school years traces substantially to summer learning difference, and (2) if achievement scores are highly correlated across stages of young people's schooling, and (3) if academic placements and attainments at the upper grades are selected on the basis of achievement scores, then (4) summer learning differences during the foundational early grades help explain achievement-dependent outcome differences across social lines in the upper grades, including the transition out of high school and, for some, into college[17].

In order to test this hypothesis, the authors used data from the Baltimore Beginning School Study (BSS) youth panel, which consists of 790 participants whose education was tracked from first grade until they were 22. Data collection began in fall 1982, and the participants were randomly selected from 20 public elementary schools. Tracked outcomes include high school curriculum placement, high school completion, and college attendance. To capture summer learning differences in elementary school, the reading comprehension scores of the California Achievement Test (CAT) were used[18]. The authors separate the reading comprehension score

[17] Alexander, Entwisle, and Olson. "Lasting Consequences of the Summer Learning Gap," 168
[18] Alexander, Entwisle, and Olson. "Lasting Consequences of the Summer Learning Gap," 169

data into 5 categories, which are displayed in Figure 5 below. Based on existing research, we would expect Alexander, Entwisle, and Olson's data to show an initial gap between low SES and high SES test scores starting in the first grade, which is attributed to unique home and family factors that affect each child before entering the school system. We would also expect low SES students to lose reading skills over the summer, while middle and high SES students gain them. The achievement gain while children are in school should be fairly constant across SES levels. Figure 5 demonstrates results consistent with these findings.

Figure 5

Table 1. Reading Comprehension Test Score Decomposition over the First Nine Years of School by Family SES

Reading Comprehension CAT Score Gains, Years 1–9	Total	Family SES			Gap
		Low SES	Mid SES	High SES	High-Low
Initial Test Score, Fall 1st Grade	279.81	271.99	277.89	298.47	26.48*
Winter Gain (5 winters)	194.97	191.30	210.19	186.11	–5.19
Summer Gain (4 summers)	11.12	–1.90	4.12	46.58	48.48*
Gain Over Years 6–9	61.69	60.95	60.73	64.34	3.39
Test Score, End Year 9	547.55	522.33	552.94	595.49	73.16*
(N)	(787)	(397)	(204)	(186)	

Note: Significant t-tests for mean differences between Low SES and High SES groups are shown in Gap column.
* $p \leq .05$ (two-tailed tests).

It is interesting to note that the data was gathered from public schools in high-poverty schools systems, therefore making the gap between low, middle, and high SES especially significant. High SES is a relative term, conceptualized here to mean parents who have most likely achieved some part of a college degree. Low SES families have parents who are mostly high school dropouts. The BSS sample is 50% low SES families[19]. When examining column 5 ("gap high-low"), we can see that approximately 30% of the gap is attributable to family/home/outside

[19] Alexander, Entwisle, and Olson. "Lasting Consequences of the Summer Learning Gap," 170

school influences before the child reaches 1st grade. The biggest chunk of the gap comes from summers during elementary school, however. Overall, Figure 5 demonstrates that throughout the course of elementary and middle school, differential summer learning loss is linked to family SES, and that leads to a sizeable achievement gap between low and high SES students. The authors then examine how this achievement gap further affects life outcomes for students. Using regression models, the authors demonstrate the low SES students are less likely to take college-preparatory classes in high school, and more likely to drop-out of high school all together and not attend a 4 year college[20]. This data is critical in understanding the scope of the summer learning loss problem, and how effective policy interventions could have long-term positive benefits for students well in to adulthood.

The Potential Causal Mechanisms behind Summer Learning Loss

The data presented above on summer slide suggests a focus on policy interventions outside of the formal school environment. While it seems that low, middle, and high income students gain roughly the same amount on test scores during the formal school year, summer presents a different set of circumstances for each individual. There are a number of mechanisms that could explain this phenomenon, which will be explored in the following section.

One prominent hypothesis, which Entwisle, Alexander, and Olson are proponents of, is the differential resource theory. It is commonly called the "faucet theory," because the "resource faucet" is turned on for all children while they share the same school environment, but then the amount of resources flowing from the faucet during the summer months is no longer consistent. Some students have more resources flowing from the faucet, and othersfewer. The faucet theory

[20] Alexander, Entwisle, and Olson. "Lasting Consequences of the Summer Learning Gap," 175

assumes that high and middle-income families have more resources available than low-income families, thus contributing to the perpetuation, or even worsening, of the achievement gap in the summer[21]. This potential mechanism posits that a quality summer intervention is necessary in order to mitigate the effects of SES on summer learning loss. The specific interventions will be reviewed in the subsequent section of this paper. In addition to the faucet theory, a number of additional hypotheses could explain the perpetuation of the achievement gap for low versus high-income students over the summer.

The "investment model" focuses on the different ways parents can invest in their children. Human capital development, scholars argue, comes from parental investments in human wealth such as time, skills, and abilities, and in-human wealth such as income and goods. The larger the investment in these items, the greater the child's educational attainment. Data shows a linear relationship between money and educational outcomes, with a 15 percent increase in the likelihood of graduation for every $10,000 increase in family income[22]. However, this linear relationship has been challenged by those who assert that the income/achievement relationship is based on a basic-needs threshold. Once the basic needs threshold is met, then income does not increase educational attainment[23]. These theories would explain the persistence of the achievement gap as a function of a lack of economic resources, but the threshold theory leaves room for additional explanatory factors. However, the investment model hypotheses do not account for the fact that income could perhaps act as a proxy for enriching summer

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[21] Geoffrey D. Borman, James Benson, and Laura T. Overman. "Families, Schools, and Summer Learning." *The Elementary School Journal* 106.2 (2005): 133

[22] McLanahan, 1985, cited in Borman, Benson, and Overman. "Families, Schools, and Summer Learning," 133

[23] Mayer, 1997, cited in Borman, Benson, and Overman. "Families, Schools, and Summer Learning," 133

experiences. If parents have a higher income, then their children might have a higher ability to participate in summer enrichment programs, visit museums, or take educational trips. Therefore, it could be the specific way in which the income is used, rather than just the presence of certain levels of income, which affects summer learning loss.

The "parental psychological resources" hypothesis focuses on parental expectations as the key ingredient in driving success in school. Proponents of this theory contend that parental expectations matter as much as SES in determining outcomes, and that higher expectations are linked positively to academic self-esteem, and students' own perception of their abilities. Additionally, some theories focus on the specific activities that take place in the summer, including both formal academic instruction and informal summer activities. A positive relationship has been observed between achievement growth and children who were read to or visited libraries during the summer, versus children who spent more time watching TV. Children who spent less time watching TV and more time in educational activities had higher reading and math scores[24].

While lack of academic instruction seems like the most plausible mechanism through which the achievement gap is perpetuated, data on summer schools has led to mixed results. The impact of summer programs has not been well-documented, often because of a lack of random assignment, multi-year participation effects, and a lack of communicated goals for summer programs and funding for evaluations[25]. However, Cooper and Charlton et. al's synthesis of 93 summer programs, which will be reviewed in depth later, demonstrated that children did gain

[24] Heyns, 1978, cited in Borman, Benson, and Overman. "Families, Schools, and Summer Learning," 133
[25] Borman, Benson, and Overman. "Families, Schools, and Summer Learning," 133-135

about 1/5 of a standard deviation in test scores over children who weren't in summer school[26]. However, middle class children benefitted more than disadvantaged children, demonstrating the importance of differential access to resources and specific family factors.

The varying hypotheses on the relationship between SES and summer learning loss lay the foundation for a variety of potential remedies to this problem. Examining the benefits and drawbacks of a number of prominent summer interventions is useful in analyzing how to best remedy the summer learning loss and therefore diminish the achievement gap.

III. Examining Existing Interventions

Do Summer Programs Work?

This section will seek to understand the specifics of summer interventions for low-income children: what elements are proven most effective and essential? What should the instructional focus of summer programs be? Should programs be implemented on a state or national level? Should they be mandatory? Outside of summer programs, should steps be taken to adjust the school calendar or hold schools more accountable to increasing achievement during the school year? Specifically, this section examines summer interventions in the context of increasing achievement for low-income children, in order to attack the achievement gap at one of its root causes. These questions will be explored in the following section of the paper.

The nature of summer programs has changed and grown over the past several decades. What originally was conceived as an idea to keep children off the streets and out of trouble, and therefore out of jail, shifted towards remedial programs that improved knowledge and skills in the 1950s. More often than not, these programs were for low income children, because higher

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[26] Harris Cooper, Kelly Charlton, Jeff C. Valentine, Laura Muhlenbruck, and Geoffrey D. Borman. "Making the Most of Summer School: A Meta-Analytic and Narrative Review." *Society for Research in Child Development* 65.1 (2000): i-vi+1-127

SES families had disposable income for tutors and specialized summer enrichment. Additionally, summer programs were often used for students who fail a course during the regular school year[27]. In 1965, the Elementary and Secondary Education Act (ESEA), Title 1, provided funding for high poverty students to have access to supplemental educational resources. In 1994, this was reauthorized as the Improving America's Schools Act. This focused on shrinking the achievement gap between high and low SES children, and led to a number of summer programs focused on remedying learning deficiencies. There are also summer programs focused on enrichment, which are usually geared towards higher SES students[28].

Despite the variation of summer school programs and the high volume of programs, studying summer programs effectively comes with a number of challenges. Many summer programs have different goals, and therefore different desired outcomes. Additionally, different measures are used for analyzing the desired outcomes. Even if outcomes and measurements are standardized, program effectiveness is dependent on student characteristics as well. Students must be motivated to actually attend and continue attending programs[29]. Specifically, understanding how summer programs work to close the achievement gap between low and high SES children is of the utmost importance.

Cooper, Charlton, Valentine, Muhlenbruck, and Borman have made a substantial step forward in analyzing summer program effectiveness by putting together a meta-analytic and narrative review of 93 summer programs. By accounting for the difficulties mentioned above,

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[27] Harris Cooper, Kelly Charlton, Jeff C. Valentine, Laura Muhlenbruck, and Geoffrey D. Borman. "Making the Most of Summer School: A Meta-Analytic and Narrative Review," 4
[28] Harris Cooper, Kelly Charlton, Jeff C. Valentine, Laura Muhlenbruck, and Geoffrey D. Borman. "Making the Most of Summer School: A Meta-Analytic and Narrative Review," 5-6
[29] Harris Cooper, Kelly Charlton, Jeff C. Valentine, Laura Muhlenbruck, and Geoffrey D. Borman. "Making the Most of Summer School: A Meta-Analytic and Narrative Review," 14

among others, the authors have presented a strong set of findings regarding what makes summer programs successful. The authors established careful criteria for programs they chose to analyze. The programs had to take place during the summer months, and participating children had to be between kindergarten and 12th grade. The summer programs had to be administered by schools, school districts, colleges, or universities, as opposed to private non-profit organizations. The goals of the program could be preventing delinquent behavior or improving achievement or attendance. Regarding analysis, the authors required that they be able to compare attending vs. not attending the summer program, that the program outcomes had to be tested empirically, and that the outcome benefit students, not teachers or parents. Participants were coded by gender, grade, achievement level, and family SES level[30]. Here, I choose to examine the results of different program elements and structures on low-income children.

Program specific factors such as the year program was offered, how long it ran, size of the community served, and whether or not students were required or invited to attend were noted. Additionally, parent involvement, group versus individual instruction, whether or not the teachers were certified, and the subject focus of the program (math, reading, language, science, other, or combination) were noted. The authors also examined when outcomes were measured. As data in section 1 demonstrated, even a few weeks difference between administrations of tests

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[30] *The authors noted achievement level of students by labeling them as "gifted" (participating in program because of special or advanced academic skills), "average" (no positive or negative reasons for participation), "at risk" (struggling in school), "below grade level/underachieving" (low test scores/repeating a course or grade) "learning or otherwise disabled" (special needs program)*
Harris Cooper, Kelly Charlton, Jeff C. Valentine, Laura Muhlenbruck, and Geoffrey D. Borman. "Making the Most of Summer School: A Meta-Analytic and Narrative Review," 18-22

can alter or mask achievement gains and losses[31]. Whether or not outcomes were measured by standardized achievement tests or by teachers is also an important factor[32].

In order to provide answers to the questions asked about the effectiveness of summer programs, means analysis was used in Cooper et. al's meta-analytic and narrative review. The mean and standard deviation of achievement test scores were measured pre and post summer intervention. Then, a d-index was created, which shows the difference in means between two groups using their common standard deviation[33].

Of the summer programs examined, 39 did not have enough information to be measured by effect size. For these programs, Cooper et. al used directional measures to determine the effect of the programs on student achievement. The evidence gathered [see appendix 1 and appendix 2] showed that most programs revealed positive effects on achievement. I further examined the five programs that accounted for all of the negative findings, and discovered that three mentioned a common thread: low-income students[34]. If low-income students are accounting for most of the negative results in this meta-analysis, how is the achievement gap going to be narrowed?

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[31] *Cooper et. al noted whether outcomes were measured right after the program ended, early the next fall (September or October), late the next fall (November or December), the next winter or spring, after 1 year, or after more than 1 year.*
Harris Cooper, Kelly Charlton, Jeff C. Valentine, Laura Muhlenbruck, and Geoffrey D. Borman. "Making the Most of Summer School: A Meta-Analytic and Narrative Review," 23

[32] Ibid.

[33] *The d-index was calculated by "subtracting the postprogram mean score from the preprogram mean score and dividing this difference by the average of the preprogram and postprogram SDs". If a control and a non-control group were examined, then the d-index was calculated by subtracting the control mean from the program mean and dividing by the average of both groups' standard deviation.*
Harris Cooper, Kelly Charlton, Jeff C. Valentine, Laura Muhlenbruck, and Geoffrey D. Borman. "Making the Most of Summer School: A Meta-Analytic and Narrative Review," 24

[34] Harris Cooper, Kelly Charlton, Jeff C. Valentine, Laura Muhlenbruck, and Geoffrey D. Borman. "Making the Most of Summer School: A Meta-Analytic and Narrative Review," 30-32

Fifty-four programs, however, were used to calculate effect sizes of summer programs on outcomes. The 54 programs were comprised mainly of remedial programs (41 studies), and also included 7 acceleration programs and 7 "other goal" programs[35]. I will focus on the success of the remedial programs, as acceleration and "other goal" programs tend to be directed towards upper-middle class families or especially gifted students. Cooper et. al found that overall, controlling for no student or program characteristics, remedial summer programs participants score one fifth of a standard deviation higher on outcome measures than the control group[36]. However, a further breakdown of the results again demonstrates that low-income and disadvantaged students are the beneficiaries of the summer programs that show negative results. A 1969 study by Fox of New York City literacy-based elementary school summer programs for students from disadvantaged neighborhoods showed lower reading scores for both 3rd and 5th graders. Additionally, a 1972 summer program for low performing Indiana inner-city elementary schoolers, evaluated by Culp, showed negative results for both math and reading, with slightly worse outcomes for math scores[37]. Even for the remaining 3 + dozen programs that showed positive effects on student outcomes, specific student characteristics were parsed out to examine the magnitude of the positive effect. Appendix 3 shows a breakdown of these student characteristics: grade level, sex, SES, and achievement label. I want to focus on SES, which the authors found was "related to evaluation outcomes under all testing conditions… the d-values

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[35] Harris Cooper, Kelly Charlton, Jeff C. Valentine, Laura Muhlenbruck, and Geoffrey D. Borman. "Making the Most of Summer School: A Meta-Analytic and Narrative Review," 39

[36] Harris Cooper, Kelly Charlton, Jeff C. Valentine, Laura Muhlenbruck, and Geoffrey D. Borman. "Making the Most of Summer School: A Meta-Analytic and Narrative Review," 52

[37] *d scores for Indiana inner-city children: math d=-.22 and reading d=-.17*
Harris Cooper, Kelly Charlton, Jeff C. Valentine, Laura Muhlenbruck, and Geoffrey D. Borman. "Making the Most of Summer School: A Meta-Analytic and Narrative Review," 54

ranged from .20 to .24 for low SES samples and from .44 to .56 for middle SES samples"[38]. It is important to note that the largest overall effect size (*d*=1.50) was from Welch and Jensen's 1990 analysis of failing middle class students, keeping in mind that most of the negative effects demonstrated earlier came from low-income students. This important conclusion shows that low-income students reap lesser benefits from the evaluated summer programs than middle/high income students.

Cooper et. al's meta-analysis allows us to draw several salient conclusions. We see that 1) overall, summer programs result in one-fifth of a standard deviation of improvement on outcome measures, that 2) most of the summer-programs that resulted in regressive scores were serving low-income children, highlighting yet another reason why adequate summer programs are essential for disadvantaged students, and 3) when effect size is stratified by student SES, middle-class students shows improvements double the standard deviation size of low-income students. Figure 6, below, shows a graph that demonstrates the impact that attending summer programs versus not attending summer programs has on reading and math skills, depending on family SES.

Figure 6

[38] Harris Cooper, Kelly Charlton, Jeff C. Valentine, Laura Muhlenbruck, and Geoffrey D. Borman. "Making the Most of Summer School: A Meta-Analytic and Narrative Review," 63

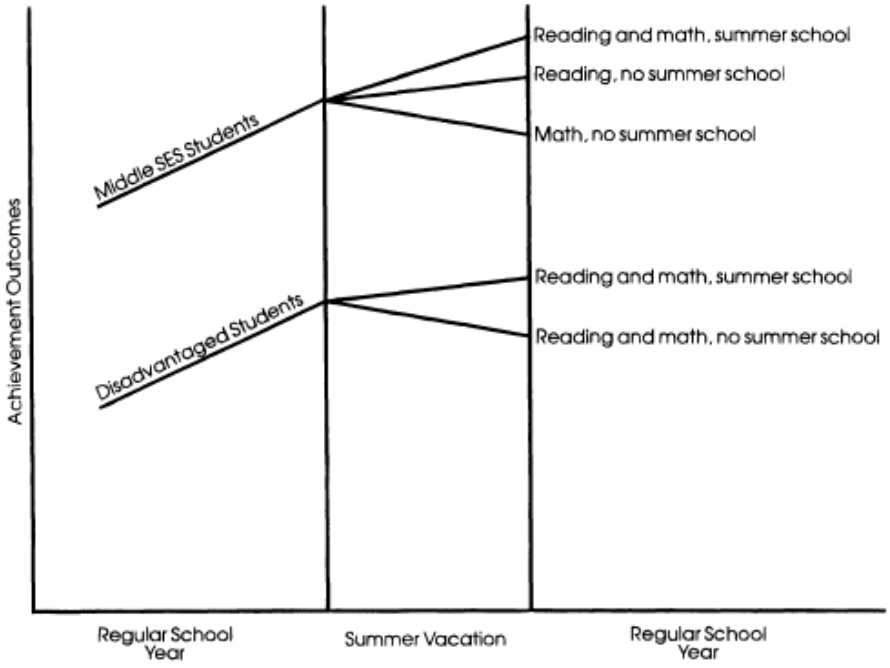

FIGURE 2.—Models of changes in achievement over summer as a function of student SES, subject areas, and summer school attendance

The data presented above clearly demonstrates that summer programs are one component of slowing summer learning loss and narrowing the achievement gap. However, summer programs are varied and unique, and policy makers are interested in knowing which, if any, structural program elements contribute to the magnitude of summer learning growth or decay. Though adequate data and information do not exist to prove whether certain program elements caused summer learning loss to diminish or grow, we can examine overall trends to produce a list of potentially testable program elements.

Cooper et. al noted several salient findings related to the specific elements and design of summer programs in their meta-analysis. First, they found that small communities or a small number of classes led to greater positive effects for remedial programs on outcomes. The authors hypothesized that "size-related program characteristics may be serving as proxies for associated difference in local control of programs and the specification and efficiency of program delivery

that comes with local control"[39]. Additionally, controlling for group versus individual instruction showed significant results. Individual instruction or small group instruction was found to have the largest positive impact on outcomes. While the above conclusions are corroborated with strong and robust data, the authors also produced several findings that are based on less robust analysis. The authors tentatively concluded that parental involvement leads to a greater positive impact on outcomes, that math achievement is affected by summer programs more than reading achievement, that achievement gains lessen as students grow older, that early elementary students gain the most from summer programs, though programs are beneficial to all grade levels, and that summer programs monitored closely for attendance and instruction quality produce higher outcomes[40].

A 2011 study by McCombs, Augustine, Schwartz, Bodilly, Mcinnis, Lichter, and Cross corroborated many of Cooper et. al's findings. McCombs et. al. conducted this study for The Wallace Foundation, which is aiming to create summer programs supported by districts for elementary and middle school students in urban areas. McComb et al gathered data through telephone interviews and site visits to summer programs in various cities[41]. The authors found, similar to Cooper et. al, that smaller class sizes, individual instruction, and high quality instruction mattered for promoting student achievement. McComb et al. also noted that aligning school year curricula and summer curricula is beneficial for students. This finding could be used

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[39] Harris Cooper, Kelly Charlton, Jeff C. Valentine, Laura Muhlenbruck, and Geoffrey D. Borman. "Making the Most of Summer School: A Meta-Analytic and Narrative Review," 92
[40] Harris Cooper, Kelly Charlton, Jeff C. Valentine, Laura Muhlenbruck, and Geoffrey D. Borman. "Making the Most of Summer School: A Meta-Analytic and Narrative Review," 96
[41] Jennifer Sloan McCombs, Catherine H. Augustine, Heather L. Schwartz, Susan J. Bodilly, Brian McInnis, Dahlia S. Lichter, and Amanda Brown Cross. "Making Summer Count: How Summer Programs Can Boost Children's Learning." *Rand Corporation* (2011): xiv.

as evidence to support district led summer programs, because it would allow administrators the ability to easily align curricula[42].

The evidence presented above on summer programs aligns with several of the potential causal mechanisms linking SES to summer learning loss. Given that both low and middle SES students show overall academic gains from attending summer programs, but middle SES children show greater gains, one could hypothesize that the "resource faucet" at home does in fact play a stronger role in the summer. The lack of a structured, formal schooling environment during the summer months leaves children much more vulnerable to the effects of differential resource access at home. While summer programs can partially mediate these effects on academics, the difference in how low and middle SES children respond to summer programs points to the importance of also addressing familial and neighborhood effects during the summer. Taking what we have learned from the available data on summer programs, where do we go from here? What methods and elements of summer programs bear further attention, increased funding, and more resources? This will be addressed, along with a review of exceptional summer programs, in the "Recommendations" section.

Moving Beyond Summer Programs: Changes to the Academic Calendar

Some argue that instead of spending time designing comprehensive summer programs, school systems should simply adapt their calendars to avoid a 3-month halt in learning. These arguments focus on year-round schooling, which generally shifts the summer break from a 3-month block to multi-week breaks every 1 ½ to 2 months, or extended school programs, which

[42] McCombs, Augustine, Schwartz, Bodilly, McInnis, Lichter, and Cross. "Making Summer Count: How Summer Programs Can Boost Children's Learning," 65

actually increase the amount of days children spend in school[43]. Year-round schooling, which was first introduced in Indiana in 1964, has been adapted by a number of districts[44]. However, the data on year round schooling has not convinced policy makers that it is the key to narrowing the achievement gap. Studies have often reported mixed results, which have been largely unable to cancel out the vocal opposition to year round schooling[45].

Extended school year programs follow a different model than year-round schooling. The average number of days spent in school for US students is approximately 175-180, while students in Japan attend school for approximately 240 days[46]. Hypothetically, achievement score data suggests that keeping children in school longer would narrow the achievement gap. However, there a variety of factors that must be taken into account if extended school calendars were adapted. Teacher quality is the main factor at risk, as teacher unions have vocalized concern over teacher burnout and fatigue due to upping school time by almost 33%. Additionally, general public opinion towards effectively eliminating extended breaks from school is not positive, with most parents stating that they want their children to "have fun and relax" in the summer months[47].

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[43] Ronald A. Fairchild and Matthew Boulay. "What if Summer Learning Loss were an Education Policy Priority?" Paper presented at the annual APPAM Research Conference, Nov. 9, 2002. 12.
[44] Elisabeth A. Palmer and Amy E. Bemis. "Year-Round Education." *College of Education and Human Development: University of Minnesota* :1
[45] Palmer and Bemis. "Year-Round Education," 4
[46] Fairchild and Boulay. "What if Summer Learning Loss were an Education Policy Priority?," 13
[47] *The Academy of Educational Development found that 43 percent of parents what their children to "have fun and relax," followed by 24 percent wanting their children to "learn new things" and 22 percent wanting their children to "prepare for school"* Ibid.

IV. Policy Recommendations

Creative, Comprehensive Summer Programming

Moving forward, policy makers at the local, district, and national level face a daunting task: how do they create summer programs that account for the differential resources that low-income children receive outside of the formal schooling environment? We know that summer programs are generally beneficial for academic achievement, but it seems that there are still barriers for low-income children in catching up to their middle and upper class counterparts. A study of 300 Baltimore students over the summer showed reading achievement losses for a high poverty group of students, but found that SES difference *among* families within the high-poverty neighborhood used in the sample were not associated with different levels of summer learning loss. This finding posits that neighborhood factors could outweigh "family-based SES differences"[48]. This data shows that there is a "large and important difference among families' levels of use of an institutionally based form of social capital- summer school programs. These differences are central to understanding how social capital affects summer learning"[49]. Though the origins of the achievement gap also need to be addressed prior to elementary school, I believe that creative summer programming that accounts for the investment, parental involvement, and neighborhood/cultural theories of summer slide can work to halt summer slide and chip away at the achievement gap, and it should be available to all low-income children.

Currently, available data does not allow policy makers to directly pinpoint exactly how to structure summer programs to best narrow the achievement gap. However, based on the above analysis of trends in summer programming literature, and drawing on examples of creative programs in action, we can present a potential plan for the future of summer programming for

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[48] Borman, Benson, and Overman. "Families, Schools, and Summer Learning," 146
[49] Borman, Benson, and Overman. "Families, Schools, and Summer Learning," 149

low-income children and youth, and direct policy makers towards areas that need further research before specific program recommendations are put into action. Though tying specific outcomes to specific elements of summer programs is not possible with current data, a common set of factors that seems to characterize effective programs has emerged from the literature reviewed. In addition to obvious elements such as smaller class sizes and individualized instruction, effective summer schools are thought to include collaborative partnerships and community-based enrichment activities and clear and specific program goals that include academic and socio-emotional outcomes. Curriculum aligned with normal school-year curriculum is also thought In addition, emphasis is placed on recruiting and training high quality staff and involving parents in the program. With these hopefully effective elements in place, incentivizing student attendance is also a key factor to success, so as to maximize benefits for the greatest number of students. After creating summer programs based on these factors, or tweaking existing programs, the final crucial step is to continuously gather data from these programs to find out what works[50].

Success in Action: Examples of Programs that Work

Currently, several programs seem to be harnessing a unique combination of program factors and producing consistent outcomes for program participants, and these programs would benefit from increased funding to support more rigorous evaluations. *Louisiana Summer Youth Opportunities Unlimited (LSYOU)* is a summer program designed for high schoolers ages 14 to 16. This program runs for 6 to 8 weeks, is residential, and has a three-part mission: improve academic achievement, increase high school completion rates, and improve college enrollment. Current data on *LSYOU* indicates that the program has been successful in fulfilling its mission.

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[50] Sun, Chris. "Summer Learning: A New Vision for Supporting Students in Summer Programs". *National Association of State Boards of Education* (2011): 8

LSYOU was found to improve math computation skills and understanding of concepts, lessened the rate of reading comprehension loss, raised graduation rates for its participants, and improved 4 out of 5 career decision making skills[51]. *LSYOU* also connected with participants beyond the summer program by offering services integrated with high schools. These services included tutoring and mentoring, preparation for standardized exit tests from high school, trips to LSU's campus, and counseling services for individuals and families[52]. Drawing on the same elements that have been proven to work for high school students, it would be interesting to apply *LSYOU* to elementary and middle school students, thus working to close the achievement gap earlier.

The Children's Defense Fund's "Freedom Schools" program serves just over 11,000 children across the country each summer, reaching children in 91 cities and 29 states in the summer of 2013. The Freedom Schools model is literacy based, and focuses on, "high quality academic enrichment, parent and family involvement, civic engagement and social action, intergenerational leadership development, and nutrition, health, and mental health"[53]. Freedom School programs have been found to be positively linked to a love of learning, community involvement, conflict resolution skills, acceptance of responsibility, and social adjustment[54]. In addition, a study of Charlotte, North Carolina Freedom Schools over 4 years showed that Freedom Schools effectively mitigated summer learning loss, with approximately 90 percent of children showing no slide in academic skills. Sixty-three percent of children demonstrated gains

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[51] Mary Terzian Ph.D., M.S.W., Kristin Anderson Moore, Ph.D., and Kathleen Hamilton, M.A. "Effective and Promising Summer Learning Programs and Approaches for Economically-Disadvantaged Children and Youth." *Child Trends* (2009): 15

[52] Terzian, Moore, and Hamilton. "Effective and Promising Summer Learning Programs and Approaches for Economically-Disadvantaged Children and Youth," 26

[53] "Program Description and 2013 Fact Sheet." *Children's Defense Fund Freedom Schools* (2013)

[54] Terzian, Moore, and Hamilton. "Effective and Promising Summer Learning Programs and Approaches for Economically-Disadvantaged Children and Youth," 19

in reading and reading comprehension[55]. By partnering with higher education institutions, community organizations and shelters, public school districts, and juvenile justice centers, Freedom Schools is effectively integrating itself into the communities it serves and is focused on making summer learning fun and engaging. Dynamic and enthusiastic "servant leader interns" are trained each summer as instructors for program participants, and Freedom Schools has trained and provided a summer job for over 14,000 college students and young adults over the past two decades[56]. With further evaluation, Freedom Schools could serve as a model for scaling up successful summer programs and reaching a high volume of children. Further examination of the academic achievement gains from Freedom Schools needs to be examined, as well as a push to include mathematics in the curriculum.

Addressing Funding Issues

Comprehensive summer programming for all low-income children poses a serious funding issue. Given that school district budgets are already tight, and cutting spending on extra-curricular and arts programs is common, a strong case must be presented to policy makers regarding the importance of summer programming. The evidence presented above, clearly demonstrates how summer break exacerbates the achievement gap, resulting in long-term consequences that diminish educational attainment, future earnings, and job options for students. Current research has narrowed potential remedies to highlight the ones most likely to make a positive impact, and funding is needed to support these effective programs, while expanding research on linking specific program inputs to achievement outcomes and how to reach all low-income students. Though many are more than hesitant to consider funding comprehensive summer programming, it addresses a major inefficiency in the school calendar that would in turn

[55] "Program Description and 2013 Fact Sheet." *Children's Defense Fund Freedom Schools*
[56] Ibid.

save school districts money that could then be directed towards summer programming. It is estimated that students lose approximately 2 months of the school year due to the time that is spent re-teaching material lost over summer break. This translates to approximately 20 percent of the school year that is not being utilized[57]. According to the U.S. Census Bureau in 2011, states spend between 6,000 and 19,000 per year per child, amounting to between $1,200 and $3,800 wasted per year, or between $14,400 and $45,600 wasted per student over the course of the education[58]. By addressing the current inefficiency in the school calendar, school districts could better allocate their resources per child, freeing up funds to be used for summer programing. In addition, funding for the proposed policy changes in this paper do not have to be raised from scratch. There are hundreds of summer programs across the country that are fully funded and operational, but would benefit from information regarding how to best serve their students and promote achievement. Once additional research has filled the gap between specific program elements and outcomes, changes can come from within for many summer programs, often requiring little to no extra funding.

V. Conclusions

The evidence presented in this paper clearly defines the magnitude of summer learning loss, and hypothesizes how family, parent, and home-life characteristics can play a major role in students' summer learning loss. Though literature on summer programming continues to grow, there is a frustrating lack of evidence when it comes to really answering the question of *how* to construct summer programs that will close the achievement gap between low and high-income children. The evidence presented here, however, shows that summer programs do indeed have the potential to close that gap, if constructed in careful, comprehensive manners. The

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[57] Fairchild and Boulay. "What if Summer Learning Loss were an Education Policy Priority?," 6
[58] Governing. "Education Spending Per Student by State." Last modified May, 2013

recommendations outlined here should serve as a guide to policy makers and researchers in terms of where to focus future research, so adequate summer programming for all children can become a reality. A future where *all* children can run out of school doors on the first day of summer towards engaging, enriching, and fun summer activities is getting closer, and it has the power to impact graduation rates, future earnings, and career outcomes for generations to come.

Appendix 1

TABLE 1

STUDIES OF REMEDIATION AND PROMOTION PROGRAMS PROVIDING ONLY DIRECTION OF OUTCOME

Author	Year of Report	Location	Sample Size	Grade or Age	Student Characteristics	Type of Comparison	Outcome Measure	Direction of Results[1]
Godon	1966	California	267	7th–9th	Below grade level	Pre-post	English, math, vocabulary, & spelling	1 mp
Richardson	1968	California	43	7th–9th	?	Pre-post	Vocabulary & comprehension	1 e 1 ap 1 an
Fox	1969	New York	1,003	3rd–5th	Below grade level	?	Reading	1 e
Deling	1972	Michigan	?	3rd–4th	Migrant	Pre-post	English	1 ap
Agnew	1973	?	150	2nd & 5th	Failing	Post-post	Vocabulary, comprehension, & communication	2 e
Roderick	1979	Michigan	23	1st–6th	Migrant	Post-post	Math & spelling	1 ap
Dailey	1979	Colorado	168	1st–10th	Migrant	Pre-post	Math & reading	5 ap
Mangino	1983	Texas	679	7th–8th	Failing	Post-post	Promotion	2 ap
Pfeifer	1985	Oregon	22	7th–8th	Failing	Post-post	English, math, science, geography, health, & world culture	2 ap
Kashmuk	1985	Oregon	129	3rd–7th	Failing	Pre-post	Math, reading, & language	5 ap 2 mp 1 mn 1 an
Burnes	1985	Colorado	2,055	k–12th	Migrant	Pre-post	English, math, & communication	1 e

Hansen	1986	Oregon	225	3rd–7th	Failing	Pre-post	Math, reading, & language	3 ap 4 mp 3 mn
Rachel	1987	Louisiana	16,261	2nd–5th	Below grade level	Post-post	Retention	4 an
Carroll	1987	Connecticut	2,242	k–8th	Below grade level	Pre-post	Math, reading, & language	3 ap
Moss	1986	Utah	761	k–12th	Migrant	Pre-post	Math, reading, & spelling	6 ap 2 mp
Moss	1988	Utah	4,443	k–12th	Migrant	Pre-post	Math, reading, & spelling	1 ap
Trangmoe	1988	Montana	330	k–6th	Migrant	Pre-post	Math & reading	27 ap
North Carolina	1988	North Carolina	11,431	3rd–8th	Failing	Pre-post	CAT	6 ap
Donaldson	1989	Ohio	127	9th–12th	At risk	Pre-post	Math, reading, & language	1 ap
McDaniel	1989	West Virginia	?	9th–10th	Below grade level	Pre-post	Math & reading	1 ap
Donaldson	1990	Ohio	123	9th–12th	Below grade level	Pre-post	Math, reading, & language	1 ap
Taggert	1991	Utah	109	3rd–8th	Migrant	Pre-post	Math & reading	4 ap
New York	1992	New York	?	9th–12th	Underachieving	Pre-post	Writing	1 ap
Rose	1992	Colorado	2,343	2nd–12th	Migrant	Pre-post	Math & reading	11 ap
Donaldson	1992	Ohio	58	9th–12th	Below grade level	Pre-post	Math, reading, & language	1 ap
Petro	1993	Colorado	1,984	2nd–12th	Migrant	Pre-post	Math & reading	2 ap
Petro	1994	Colorado	1,069	2nd–10th	Migrant	Pre-post	Math & reading	1 ap 1 e
Curry	1996	Texas	172	?	Below reading level	Pre-post	Math & reading	2 an 2 ap
McNeeley	1996	Illinois	175	3rd–6th	Below reading level	Pre-post	English	1 ap
Ouellette	1998	Minnesota	3,892	4th–6th	?	Pre-post	Math & reading	5 ap

[1]This column contains the number of independent samples revealing comparisons that were all positive (ap), mostly positive (mp), even (e), mostly negative (mn), and all negative (an).

Appendix 2

TABLE 6

STUDENT MODERATORS OF REMEDIAL SUMMER SCHOOL EVALUATION OUTCOMES

		Unadjusted *d*-indexes						Adjusted *d*-indexes					
		Fixed			Random			Fixed			Random		
Moderator	*k*	*Q*	*d*	+/−ci	*Q*	*d*	+/−ci	*Q*	*d*	+/−ci	*Q*	*d*	+/−ci
Lowest Grade	96	8.61*			0.09			78.47*			2.31		
k–2	29		.31	.05		.32	.10		.20	.05		.20	.05
3–4	39		.14	.04		.14	.07		.15	.03		.19	.07
5–8	28		.31	.03		.35	.09		.35	.03		.36	.08
Highest Grade	96	10.31*			0.07			64.05*			1.54		
k–3	32		.24	.05		.24	.09		.19	.05		.22	.07
4–6	35		.19	.04		.21	.10		.17	.04		.19	.07
7–12	29		.29	.03		.31	.09		.35	.03		.34	.09
Sex of Sample	19	0.16			0.16			2.81			0.22		
females	8		.13	.13		.13	.13		.38	.13		.32	.21
males	11		.10	.09		.10	.09		.24	.09		.23	.11
SES	48	7.02*			3.83			4.38*			4.38*		
low	42		.23	.03		.20	.07		.24	.03		.20	.06
middle	6		.56	.24		.46	.41		.49	.24		.44	.31
Achievement Label	99	22.01*			0.62			49.72*			3.92		
failing	26		.23	.04		.25	.09		.21	.04		.23	.07
disability	18		.34	.05		.27	.11		.23	.05		.25	.07
underachieving	31		.27	.04		.29	.11		.36	.03		.36	.11
at-risk	24		.19	.04		.23	.09		.19	.04		.20	.08

*$p < .05$.

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