

RESEARCH ARTICLE

Breakfast and the Achievement Gap Among Urban Minority Youth

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ABSTRACT

OBJECTIVES: To outline the prevalence and disparities of breakfast consumption among school-aged urban minority youth, causal pathways through which skipping breakfast adversely affects academic achievement, and proven or promising approaches for schools to increase breakfast consumption.

METHODS: Literature review.

RESULTS: On any given day a substantial proportion of American youth do not eat breakfast. On an average day, less than half (~46%) of children participating in free or reduced-price lunch also participated in the School Breakfast Program for which they were also eligible. In a large study of 9-year-olds, 77% of White girls and 57% of Black girls consumed breakfast on all 3 days assessed; by age 19, the respective rates were 32% and 22%. Neuroscience research has identified the processes by which dietary behavior influences neuronal activity and synaptic plasticity, both of which influence cognitive functions. Participation in School Breakfast Programs has also been associated with reduced absenteeism. Universal School Breakfast Programs and allowing youth to eat breakfast in the classroom (vs cafeteria) are approaches that have been shown to increase participation.

CONCLUSIONS: Skipping breakfast is highly and disproportionately prevalent among school-aged urban minority youth, has a negative impact on academic achievement by adversely affecting cognition and absenteeism, and effective practices are available for schools to address this problem. Despite wide availability, the majority of American youth do not participate in School Breakfast Programs. High-quality universal breakfast programs that allow students to eat breakfast in the classroom are especially needed for youth who are not likely to get good nutrition the rest of the day.

Keywords: breakfast; diet; nutrition; cognition; school connectedness; school absenteeism; child and adolescent health; coordinated school health programs; academic achievement; achievement gap; socioeconomic factors.

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OVERVIEW AND DISPARITIES

Diet has a pervasive and profound impact on human health. Specific nutrient inadequacies during childhood can affect brain development and have lifelong health consequences, including cognitive effects. A full outline of diet and dietary intake disparities in relation to health and educational outcomes is far beyond the current scope. The current focus is breakfast. This is not to say that the total dietary pattern is less important. Indeed, among the tens of thousands of published studies on diet and health, one of the most robust findings, reflected in current national dietary recommendations, is the value of eating a balanced diet rich in fruits, vegetables, and whole grains. Breakfast alone is addressed here because of its importance to educational outcomes and because it can be addressed at school.

The nature and extent of hunger in the United States compares favorably with that in developing countries, yet food insecurity affects millions of American households, especially those with incomes near or below the federal poverty level. A nationally representative survey conducted by the US Department of Agriculture found approximately 11% of US households (12.6 million) to be “food-insecure” (ie, having difficulty providing enough food for household members due to lack of resources); about one third of these (4.6 million) were characterized as very low food security (ie, having reduced intakes and disrupted eating patterns by some household members).¹ Reportedly, most children in households so classified were shielded from both reduced intakes and disrupted eating patterns, but children and adults in 221,000 US households did experience one or both consequences at some time during the year preceding

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the survey. On any given day, 600,000 to 877,000 households experienced the consequences of very low food security, including 29,000 to 33,000 where children were directly affected. Some research suggests that families exposed to winter climate variations may spend less and eat less during sudden periods of extreme weather due to extra costs of household heat.²

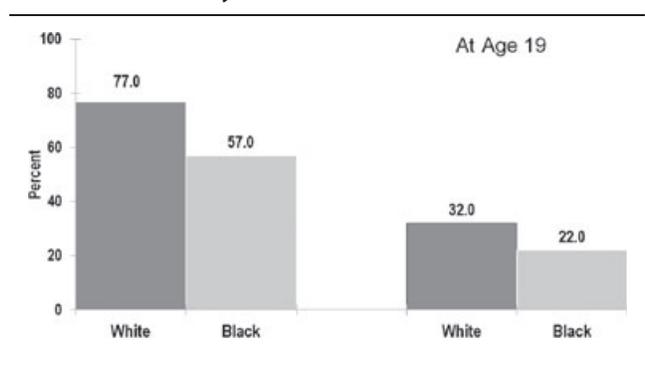
In children, food insecurity has been associated with a wide range of adverse effects on growth and development.³ Inadequate intake of iron increases susceptibility to toxic effects of lead.^{4,5} Specific nutrient intake deficits have been linked to physical and mental health problems,⁶⁻⁸ emotional and behavioral problems,⁶ learning deficiencies,⁹ poor access to health care (eg, no usual source of care, postponed medications and well-care visits, increased emergency department use),¹⁰ lower arithmetic grades and repeating a grade,⁶ and worse quality of life.¹¹ One strategy for addressing hunger and food insecurity among youth is through food assistance programs, including the school breakfast program.

Touted as the most important meal of the day, breakfast differs qualitatively from other eating occasions by virtue of being consumed (typically) after a short fast during sleep. This timing has implications for how the body, most particularly the brain, responds to (1) further delay in eating and (2) what is eaten. A considerable body of research, summarized below, suggests that breakfast has direct and indirect effects on educational outcomes. Despite the well-accepted benefits of eating breakfast, many youth, and especially low-income, urban minority youth, attend school on an empty stomach.

Several data sources indicate that a substantial proportion of American youth do not eat breakfast on any given day. Among 18,000+ adolescents participating in the National Longitudinal Study of Adolescent Health, approximately 20% did not eat breakfast on the day preceding the interview.¹² Among 1166 White and 1213 African-American girls participating in the National Heart, Lung, and Blood Institute's Longitudinal Growth and Health Study, breakfast consumption declined with age. Seventy-seven percent of White girls and 57% of African American girls consumed breakfast on all 3 days assessed at age 9; by age 19, the figures dropped to 32% and 22%, respectively (Figure 1).¹³ Note that while the absolute racial disparities decreased over time, the relative disparities increased.

In a study of 1151 low-income African American 2nd to 5th graders in New Jersey, 12% to 26% attended school on any given day without having eaten anything.¹⁴ In another study of 846 inner-city high school students in San Diego, 57% had not eaten breakfast on the day of the survey; girls were more likely than boys to have skipped breakfast (61% vs

Figure 1. Percentage of White and Black Girls Who Consumed Breakfast on All 3 Days Assessed



Source: NHLBI, Longitudinal Growth and Health Survey; n = 1166 White and 1213 Black girls.

54%).¹⁵ Among more than 500 4th grade students in urban, suburban, and rural public schools in Maryland, approximately 20% skipped breakfast and/or lunch at least 3 times per week; urban students were twice as likely to report skipping breakfast.¹⁶ Among more than 3500 middle school students in central Kentucky, approximately 13% did not consume breakfast in the 7 days preceding the survey; under half (45%) consumed breakfast every day. Disparities in breakfast consumption among urban minority youth may be influenced, in part, by lack of time and appetite in the morning,¹⁵ as well as by economic factors that affect household food security.

An analysis of data from more than 18,000 adolescents participating in the National Longitudinal Study of Adolescent Health (first interview) indicated that, compared with males and younger adolescents, females and older adolescents were more likely to not eat anything in the morning.¹² Youth in families with parents having higher levels of education were less likely to have skipped breakfast.¹² Adolescents who report being overweight were less likely to eat breakfast,¹² perhaps based on the false impression that skipping breakfast is a good way to not gain or to lose weight.¹⁷⁻²⁰

CAUSAL PATHWAYS AFFECTING EDUCATIONAL OUTCOMES

The influence of breakfast on various learning outcomes has been investigated for decades and the quantity and quality of research documenting such effects are improving. Neurosciences research has identified the molecular and cellular processes by which dietary behavior influences neuronal activity and synaptic plasticity, both of which influence cognitive functions. Research specifically linking breakfast and connectedness has not been conducted, but several plausible links have been identified. The two strongest and most consistently reported mechanisms by which breakfast may influence

learning outcomes are via increased school attendance and decreased tardiness. It's axiomatic that learning in school will be compromised if youth are absent or late.

Cognition

Until recently, reviews of published studies on the relationship between breakfast and cognitive performance in children have only yielded suggestive results, particularly among the malnourished. But study limitations precluded more definitive conclusions. Recent advances in neuroscience indicate that specific nutrients act on molecular systems or cellular processes that are essential for cognition.²¹ An emerging body of research is documenting the adverse effects of skipped breakfast on various aspects of cognitive performance: alertness,²² attention,²³⁻²⁵ memory,^{22,24-27} processing of complex visual display,²⁸ problem solving,²⁹ and mathematics.^{30,31}

Connectedness

No published studies have specifically examined the relationship between breakfast consumption and connectedness with school. However, research documenting the relationship between breakfast and mental health suggests a variety of avenues by which skipping breakfast may undermine connectedness with teachers and peers. At the extreme, severe hunger in school-aged children is associated with anxiety and depression.⁸ Short of the extreme, children in food insufficient households have been found to be more likely to have seen a psychologist and to have more difficulty getting along with other children.⁶ Some data suggest an association between skipping breakfast and mental distress,³² while consuming a high-quality breakfast (judged by number of core food groups consumed) was associated with better mental health.³³ Participation in school breakfast programs has been associated with fewer psychosocial problems.³⁴ It is not suggested that participation in school breakfast programs alone can address the mental or emotional needs of youth. However, to the extent that skipping breakfast adversely affects emotional well-being, eating breakfast can be expected to improve connectedness at school.

Absenteeism

In recent domestic and international research, some of which controlled for socioeconomic status, participation in school breakfast programs was associated with reduced absenteeism.^{26,35,36} Similar findings have been found for inner-city children in the United States.^{31,37} The opportunity to eat a no-cost nourishing breakfast may provide motivation for parents and their children to attend school and arrive on time. It is reasonable to expect that this would be especially true for families with lower income levels.

WHAT CAN SCHOOLS DO TO INCREASE BREAKFAST CONSUMPTION?

School-based programs can greatly influence the extent to which youth eat breakfast. In 2007-2008, the nationwide School Breakfast Program, which began as a pilot program in 1966 and became permanent in 1975, provided breakfast for approximately 8.5 million low-income children.³⁸ However, on an average day, less than half (~46%) of the children who participated in free or reduced price lunch also participated in the School Breakfast Program for which they were also eligible.³⁸ During these times of economic recession, it is particularly important for schools to implement strategies to help ensure that youth from low-income families eat breakfast.

In addition to educational and health benefits for youth, increased School Breakfast Program participation can increase federal funding of state budgets. In the school year 2007-2008, if all states had reached a rate of 60 school breakfast participants for every 100 school lunch participants, the states would have received \$561 million in additional federal child nutrition funding. In New York State alone the estimated loss of revenue was more than \$53 million. In California the estimated loss was more than \$94 million.³⁸ Thus, low participation in the School Breakfast Program reflects poorly on state-level public policy from an economic, as well as from educational and public health, perspectives.

Various barriers to participation in the School Breakfast Program have been identified, two of which seem particularly relevant and amenable to change: (1) stigma associated with participation in a program intended for youth from low-income families and (2) having to arrive at school early enough to eat breakfast before classes begin. A universal school breakfast program would address the first issue. Allowing youth to eat breakfast in the classroom rather than the cafeteria would address the second.

Universal school breakfast programs, where free breakfast is offered to all students, have been shown to increase participation in school breakfast dramatically.³⁹ Four states, Illinois, Maryland, Massachusetts, and North Carolina, provide state-level funding for universal breakfast programs. Since increased participation generates revenue, there is often no additional cost or only minimal resultant cost to the school, particularly in schools where high proportions of students qualify for free or reduced-priced meals.³⁹ The availability of a universal breakfast program alone, without efforts to increase participation, should not be expected to reduce rates of breakfast skipping or to substantively change overall dietary intakes.⁴⁰

Allowing students to eat breakfast in the classroom in the morning, as opposed to in the cafeteria before

school starts, has been found to be an acceptable and effective strategy for increasing participation in school breakfast. This alternative makes it easier for youth to participate.³⁹ In-class breakfast has been shown to be both feasible and acceptable.⁴¹

The School Breakfast Program provides an opportunity to begin each school day on a positive note. Some programs use the time to allow students to read or be read to; others simply provide time for socializing. To the extent that participation is enjoyable, participation will be enhanced. Food preferences can be expected to exert an influence and these preferences will vary by age, gender, and cultural background, among other factors. Participation may be increased by offering foods that are not only within the scope of options stipulated by federal regulations, but that cater to students' likes.

Given the potential educational and health benefits for youth and the economic benefits for school budgets, schools should work to increase parents' motivation to have their children regularly participate in school breakfast programs. Educational outreach to parents could focus on communicating both the substantive educational and health benefits and the federal-funding implications of breakfast program participation. Various resources are available for school leaders who want to initiate or improve a school breakfast program.^{38,42-44}

PROVEN OR PROMISING APPROACHES

To date, no large-scale, rigorously controlled, randomized trial with the school as the unit of assignment and analysis has assessed the effects of breakfast on learning outcomes. Such a study is currently under way in the United Kingdom.⁴⁵ The US Department of Agriculture did conduct a study of universal free breakfast compared with the regular school breakfast program in 6 school districts, including 153 elementary schools, and they did not find differences between the schools with respect to academic achievement, attendance, or overall daily food or nutrient intakes. Since in this sample there were no differences between the groups in average food and nutrient intakes that may, in part, explain these findings. In contrast, using data from the National Health and Nutrition Examination Study, Bhattacharya, Currie, and Haider⁴⁶ found that availability of the School Breakfast Program (vs no program) improved children's nutrient intakes: children were less likely to be deficient in serum levels of vitamin C, vitamin E, and folate, more likely to meet recommendations for intakes of fiber, potassium, and iron, have overall better dietary quality, and consume less calories from fat while not consuming more overall calories.

Limitations to current knowledge preclude definitive conclusions regarding the effects of breakfast on learning. Numerous individual studies have reported findings suggesting that breakfast consumption favorably affects a variety of learning outcomes.^{22-25,28,31,34,37} Some recent reviewers concluded that, while not definitive, results are very promising, particularly for youth with nutritional deficiencies.²⁶ Some found the evidence for short-but not the long-term effects of breakfast on cognition compelling.⁴⁷ Some concluded that the results are promising but not conclusive³⁵ or that available evidence is not compelling.⁴⁸ Further, the effects of breakfast may be mediated by the nature of the foods consumed (eg, glycemic indices),^{28,49} the time when breakfast is eaten relative to the cognitive ability assessment,^{27,50} and the particular cognitive abilities assessed. What appears less equivocal is that eating a high-quality breakfast can improve school attendance.^{26,35,36}

The last decade has witnessed improved understanding about how and why eating breakfast can affect ability to learn. Research has explicated the effects of dietary intake on neuronal function and synaptic plasticity.²¹ Importantly, this new neurosciences research indicates that a particular cause (eg, dietary intake) is likely to work synergistically in combination with other causes (eg, physical activity and sleep).²¹ It is, therefore, not surprising that results from evaluative research on breakfast have varied. Given this context, it is reasonable to infer that eating a nutritious breakfast on a regular basis, combined with other healthful habits, will increase the likelihood that students are ready and able to learn.

SUMMARY

Skipping breakfast is a prevalent behavior among American youth and is one of various factors that can contribute to a poor quality diet. Despite wide availability of school breakfast programs, the majority of American youth do not participate. The wisdom of our elders instinctively recognized the importance of breakfast as the "most important meal of the day," epitomized by the now common practice of sending home a letter before standardized tests urging the student to have a good breakfast on the morning of test day. An emerging body of research is documenting how and, more importantly, why breakfast consumption influences cognitive functioning, quality of overall diet, risk of being overweight, and emotional well-being. The school breakfast and lunch programs and the availability of other "competitive" foods within schools (eg, vending machine "junk food") provide a context in which the school is a central source of daily dietary intake for millions of American youth. Policies

and programs within schools have the potential to favorably influence dietary behavior. Increased participation in school breakfast programs is one of several key strategies to improve the dietary status of youth and thereby influence their readiness to learn. High-quality breakfast programs are especially needed for youth who are not likely to get good nutrition the rest of the day.

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