RESEARCH BRIEF: BREAKFAST FOR LEARNING

Food Research & Action Center

Skipping Breakfast and Experiencing Hunger Impair Children's Ability to Learn

- Behavioral, emotional, mental health, and academic problems are more prevalent among children and adolescents struggling with hunger.[1,2,3,4]
- Children and adolescents experiencing hunger have lower math scores and poorer grades.[5,6]
- Children experiencing hunger are more likely to be hyperactive, absent, and tardy, in addition to having behavioral and attention problems more often than other children.[7]
- Teens experiencing hunger are more likely to have been suspended from school and have difficulty getting along with other children.[8]
- Children with hunger are more likely to have repeated a grade, received special education services, or received mental health counseling, than low-income children who do not experience hunger.[9]
- Students who are undernourished have poorer cognitive functioning when they miss breakfast.[10]
- Students who skip breakfast are less able to differentiate among visual images, show increased errors, and have slower memory recall.[11]

Eating Breakfast, Including at School, Helps Improve Student Academic Performance and Behavior

- Children who eat breakfast at school — closer to class and test-taking time — perform better on standardized tests than those who skip breakfast or eat breakfast at home.[12]
- Students who eat breakfast the morning of a standardized test have significantly higher scores in spelling, reading, and math, compared to those who do not eat breakfast.[13]
- Student academic achievement increases, especially for math, when schools offer the School Breakfast Program.[14]
- Students who participate in school breakfast show improved attendance, behavior, and academic performance as well as decreased tardiness.[15,16,17,18]
- Providing breakfast to students at school improves their concentration, alertness, comprehension, memory, and learning.[19,20,21]
- Children who eat breakfast show improved cognitive function, attention, and memory.[22]
- Consuming breakfast improves children's performance on mathematical tasks, vocabulary tests, demanding mental tasks, and reaction to frustration.[23,24,25]

Breakfast in the Classroom Programs* and Programs Offering Breakfast at no Cost to all Children† in the Cafeteria Yield Other Positive Results

- Children who increase their school breakfast participation as a result of a school breakfast program offered at no cost to all students show greater improvements in math scores, attendance, punctuality, depression, anxiety, and hyperactivity than children whose participation remains unchanged or decreases.[26]

*Breakfast in the classroom programs are an increasingly popular alternative to traditional, before-the-bell, cafeteria-based breakfast programs. Breakfast is brought in from the kitchen in containers that keep dishes at the right temperature, or is picked up from carts in the hallways as students enter class. Typically this breakfast is offered at no cost to all students. Such programs boost school breakfast participation and remove the stigma associated with participation.

†Offering breakfast at no cost to all students is sometimes referred to as "universal breakfast" or "universal-free breakfast." The program helps remove the stigma for low-income children of participation in school breakfast and thereby increases participation among students generally, but particularly low-income students.

- Providing students with breakfast in the classroom setting is associated with lower tardy rates, fewer disciplinary office referrals, and improved attendance rates.[27,28]
- Student math and reading achievement test scores improve when breakfast is moved out of the cafeteria and into the classroom.[29]
- Schools that offer breakfast at no cost to all students have higher breakfast participation, especially when breakfast is served in the classroom.[30,31,32,33,34,35]
- Breakfast in the classroom is associated with more students eating breakfast as well as better overall dietary quality.[36]
- Students attending schools that offer breakfast at no cost to all students are more likely to consume a nutritionally substantive breakfast and to consume significantly more calcium, magnesium, phosphorus, fruit, and dairy products at breakfast, when compared to students from schools with a traditional means-tested school breakfast program.[37]
- Schools that offer breakfast in the classroom programs at no cost to all students experience an increased sense of community and reduced stigma associated with eating breakfast at school.[38,39,40]

Beliefs About Breakfast Can Influence Participation in School Breakfast

- Adolescent girls often skip breakfast because they believe it might contribute to weight gain.[41,42]
- Adolescents who skip breakfast are significantly more likely to have fasted to lose weight.[43]
- Children report that they believe eating breakfast increases their energy and ability to pay attention in school.[44]

School Breakfast Decreases the Risk of Food Insecurity

- School breakfast offered at no cost to all students may eliminate disparities between food-secure and food-insecure children in terms of eating breakfast at all.[45]
- Students with improved nutrient intake as a result of a program that offers school breakfast at no cost to all students report decreases in symptoms of hunger.[46]
- Access to school breakfast decreases the risk of marginal food insecurity and breakfast skipping, especially for low-income children.[47,48,49]
- Rates of food insecurity among children are higher in the summer — a time when many do not have access to the good nutrition provided by the school meal programs available during the academic year.[50,51]

School Breakfast Can Improve Children's Dietary Intake and Protect Against Obesity and Other Negative Health Outcomes‡

- School breakfast participants are more likely to consume diets that are adequate or exceed standards for important vitamins and minerals (e.g., vitamin C, vitamin A, calcium, phosphorous).[52,53,54]
- Children and adolescents who skip breakfast tend to have poorer nutrient intakes than those who eat breakfast. Eating breakfast regularly has been linked with greater intake of fiber, calcium, iron, vitamin C, and other vitamins and minerals, and lower intake of fat, cholesterol, and sodium.[55,56,57]
- School breakfast participation is associated with a lower body mass index (BMI, an indicator of excess body fat), lower probability of being overweight, and lower probability of obesity.[58,59,60,61]
- Children and adolescents who eat breakfast have more favorable weight-related outcomes (e.g., lower BMI, lower waist circumference, lesser likelihood of being chronically obese, decreased risk of obesity) in the short term and long term than those who skip breakfast.[62,63,64,65,66,67,68,69,70,71]
- School breakfast, including breakfast offered at no cost to all students, has been linked with fewer visits to the school nurse, particularly in the morning.[72]

‡For more information, read FRAC's *Breakfast for Health* brief available at www.frac.org.

This brief was originally prepared in September 2011 and updated in the spring of 2014 by FRAC's Madeleine Levin, MPH, Senior Policy Analyst. This brief was updated again in October 2016 by FRAC's Heather Hartline-Grafton, DrPH, RD, Senior Nutrition Policy and Research Analyst.

Endnotes

[1] Kleinman, R. E., Murphy, J. M., Little, M., Pagano, M., Wehler, C. A., Regal, K., & Jellinek, M. S. (1998). Hunger in Children in the United States: Potential Behavioral and Emotional Correlates. *Pediatrics*, 101(1), E3.

[2] Kimbro, R. T., & Denney, J. T. (2015). Transitions into food insecurity associated with behavioral problems and worse overall health among children. *Health Affairs*, 34(11), 1949-1955.

[3] Poole-Di Salvo, E., Silver, E. J., & Stein, R. E. (2016). Household food insecurity and mental health problems among adolescents: what do parents report? *Academic Pediatrics*, 16(1), 90-96.

[4] Shanafelt, A., Hearst, M. O., Wang, Q., & Nanney, M. S. (2016). Food insecurity and rural adolescent personal health, home, and academic environments. *Journal of School Health*, 86(6), 472-480.

[5] Alaimo, K., Olson, C. M., & Frongillo, E. A., Jr. (2001). Food Insufficiency and American School-Aged Children's Cognitive, Academic and Psychosocial Development. *Pediatrics*, 108(1), 44-53.

[6] Shanafelt, A., Hearst, M. O., Wang, Q., & Nanney, M. S. (2016). Food insecurity and rural adolescent personal health, home, and academic environments. *Journal of School Health*, 86(6), 472-480.

[7] Murphy, J. M., Wehler, C. A., Pagano, M. E., Little, M., Kleinman, R. F., & Jellinek, M. S. (1998). Relationship Between Hunger and Psychosocial Functioning in Low-Income American Children. *Journal of the American Academy of Child & Adolescent Psychiatry*, 37, 163-170.

[8] Alaimo, K., Olson, C. M., & Frongillo, E. A., Jr. (2001). Food Insufficiency and American School-Aged Children's Cognitive, Academic and Psychosocial Development. *Pediatrics*, 108(1), 44-53.

[9] Kleinman, R. E., Murphy, J. M., Little, M., Pagano, M., Wehler, C. A., Regal, K., & Jellinek, M. S. (1998). Hunger in Children in the United States: Potential Behavioral and Emotional Correlates. *Pediatrics*, 101(1),E3.

[10] Taras, H. (2005) Nutrition and Student Performance at School. *Journal of School Health*, 75(6), 199-213.

[11] Pollitt, E., Cueto, S., & Jacoby, E. R. (1998). Fasting and Cognition in Well- and Undernourished Schoolchildren: A Review of Three Experimental Studies. *American Journal of Clinical Nutrition*, 67(4),779S-784S.

[12] Vaisman, N., Voet, H., Akivis, A., & Vakil, E. (1996) Effects of Breakfast Timing on the Cognitive Functions of Elementary School Students. *Archives of Pediatric and Adolescent Medicine*, 150, 1089-1092.

[13] Ptomey, L. T., Steger, F. L., Schubert, M. M., Lee, J., Willis, E. A., Sullivan, D. K., Szabo-Reed, A. N., Washburn, R. A., & Donnelly, J. E. (2016). Breakfast intake and composition is associated with superior academic achievement in elementary schoolchildren. *Journal of the American College of Nutrition*, 35(4), 326-333.

[14] Frisvold, D. E. (2015). Nutrition and cognitive achievement: an evaluation of the School Breakfast Program. *Journal of Public Economics*, 124, 91–104.

[15] Murphy, J. M. (2007). Breakfast and Learning: An Updated Review. *Journal of Current Nutrition and Food Science*, 3(1), 3-36.

[16] Basch, C. E. (2011). Breakfast and the Achievement Gap Among Urban Minority Youth. *Journal of School Health*, 81 (10), 635-640.

[17] Murphy, J. M., Pagano, M., Nachmani, J., Sperling, P., Kane, S., & Kleinman, R. (1998). The Relationship of School Breakfast to Psychosocial and Academic Functioning: Cross-sectional and longitudinal observations in an inner-city sample. *Archives of Pediatric and Adolescent Medicine*, 152,899-907.

[18] Powell, C. A., Walker, S. P., Chang, S. M., & Grantham-McGregor, S. M. (1998). Nutrition and education: a randomized trial of the effects of breakfast in rural primary school children. *American Journal of Clinical Nutrition*, 68, 873-9.

[19] Grantham-McGregor, S., Chang, S., & Walker, S. (1998). Evaluation of School Feeding Programs: Some Jamaican Examples. *American Journal of Clinical Nutrition,* 67(4) 785S-789S.

[20] Brown, J. L., Beardslee, W. H., & Prothrow-Stith, D. (2008). Impact of School Breakfast on Children's Health and Learning. Sodexo Foundation.

[21] Morris, C. T., Courtney, A., Bryant, C. A., & McDermott, R. J. (2010). Grab 'N' Go Breakfast at School: Observation from a Pilot Program. *Journal of Nutrition Education and Behavior*, 42(3), 208-209.

[22] Wesnes, K. A., Pincock, C., Richardson, D., Helm, G., & Hails, S. (2003). Breakfast reduces declines in attention and memory over the morning in schoolchildren. *Appetite*, 41(3), 329-31.

[23] Bellisle, F. (2004). Effects of diet on behaviour and cognition in children. *British Journal of Nutrition*, 92 (Supplement 2), S227-S232.

[24] Pivik, R. T., Tennal, K. B., Chapman, S. D., & Gu, Y. (2012). Eating breakfast enhances the efficiency of neural networks engaged during mental arithmetic in school-aged children. *Physiology & Behavior*, 106, 548-555.

[25] Pollitt, E., Cueto, S., Jacoby, E. R. (1998). Fasting and Cognition in Well- and Undernourished Schoolchildren: A Review of Three Experimental Studies. *American Journal of Clinical Nutrition*, 67(4), 779S-784S.

[26] Murphy, J. M., Pagano, M., Nachmani, J., Sperling, P., Kane, S., & Kleinman, R. (1998). The Relationship of School Breakfast to Psychosocial and Academic Functioning: Cross-sectional and longitudinal observations in an inner-city sample. *Archives of Pediatric and Adolescent Medicine*, 152, 899-907.

[27] Murphy, J. M., Drake, J. E., & Weineke, K. M. (2005). *Academics & Breakfast Connection Pilot: Final Report on New York's Classroom Breakfast Project*. Nutrition Consortium of New York State. Albany, New York.

[28] Anzman-Frasca, S., Djang, H. C., Halmo, M. M., Dolan, P. R., & Economos, C. D. (2015). Estimating impacts of a breakfast in the classroom program on school outcomes. *JAMA Pediatrics*, 169(1), 71-77.

[29] Imberman, S. A., & Kugler, A. D. (2014). The Effect of Providing Breakfast in Class on Student Performance. *Journal of Policy Analysis and Management*, 33(3), 669-699.

[30] McLaughlin, J. E., Bernstein, L. S., Crepinsek, M., K., Daft, L. M., & Murphy, J. M. (2002). *Evaluation of the School Breakfast Program Pilot Project: Findings from the First Year of Implementation*. U.S. Department of Agriculture, Food and Nutrition Service. Report No. CN-02-SBP.

[31] Murphy, J. M., Pagano, M., & Bishop, S. J. (2001). *Impact of a Universally Free, In-Classroom School Breakfast Program on Achievement; Results from the Abell Foundation's Baltimore Breakfast Challenge Program*. Massachusetts General Hospital, Boston, MA.

[32] Crepinsek, M. K., Singh, A., Bernstein, L. S., & McLaughlin, J. E. (2006). Dietary Effects of Universal-Free School Breakfast: Finding from the Evaluation of the School Breakfast Program Pilot Project. *Journal American Dietetic Association*, 106(11), 1796-1803.

[33] Nanny, M. S., Olaleye, T. M., Wang, Q., Motyka, E., & Klund-Schubert, J. (2011). *A pilot study to expand the school breakfast program in one middle school*. TBM, 1, 436-442

[34] Corcoran, S. P., Elbel, B., & Schwartz, A. E. (2016). The effect of breakfast in the classroom on obesity and academic performance: evidence from New York City. *Journal of Policy Analysis and Management*, 35(3), 509-532.

[35] Anzman-Frasca, S., Djang, H. C., Halmo, M. M., Dolan, P. R., & Economos, C. D. (2015). Estimating impacts of a breakfast in the classroom program on school outcomes. *JAMA Pediatrics*, 169(1), 71-77.

[36] Ritchie, L. D., Rosen, N. J., Fenton, K., Au, L. E., Goldstein, L. H., & Shimada, T. (2015). School breakfast policy is associated with dietary intake of fourth- and fifth-grade students. *Journal of the Academy of Nutrition and Dietetics*, 116(3), 449-457.

[37] Crepinsek, M. K., Singh, A., Bernstein, L. S., & McLaughlin, J. E. (2006). Dietary Effects of Universal-Free School Breakfast: Finding from the Evaluation of the School Breakfast Program Pilot Project. *Journal American Dietetic Association*, 106(11), 1796-1803.

[38] Morris, C. T., Courtney, A., Bryant, C. A., & McDermott, R. J. (2010). Grab 'N' Go Breakfast at School: Observation from a Pilot Program. *Journal of Nutrition Education and Behavior*, 42(3), 208-209.

[39] Haesly, B., Nanney, M. S., Coulter, S., Fong, S., & Pratt, R. J. (2014). Impact on Staff of Improving Access to the School Breakfast Program: A Qualitative Study. *Journal of School Health*, 84(4), 267-274.

[40] Bailey-Davis, L., Virus, A., McCoy, T. A., Wojtanowski, A., & VenderVeur, S. S. (2013). Middle School Student and Parent Perceptions of Government — Sponsored Free School Breakfast and Consumption: A Qualitative Inquiry in an Urban Setting. *Journal of the Academy of Nutrition and Dietetics*, 113(2), 251-257.

[41] Reddan, J., Wahlstrom, K., & Reicks, M. (2002). Children's perceived benefits and barriers in relation to eating breakfast in schools with or without Universal School Breakfast. *Journal of Nutrition Education and Behavior*, 34, 47-52.

[42] Cohen, B., Evers, S., Manske, S., Bercovitz, K., & Edward, H. G. (2003). Smoking, physical activity and breakfast consumption among secondary school students in a southwestern Ontario community. *Canadian Journal of Public Health*, 94, 41-44.

[43] Zullig, K., Ubbes, V. A., Pyle, J., & Valois, R. F. (2006). Self-Reported Weight Perceptions, Dieting Behavior, and Breakfast Eating Among High School Adolescents. *Journal of School Health*, 76(3), 87-92.

[44] Reddan, J., Wahlstrom, K., & Reicks, M. (2002). Children's perceived benefits and barriers in relation to eating breakfast in schools with or without Universal School Breakfast. *Journal of Nutrition Education and Behavior*, 34, 47-52.

[45] Khan, S., Pinckney, R. G., Keeney, D., Frankowski, B., & Carney, J. K. (2009). Prevalence of food insecurity and utilization of food assistance program: an exploratory survey of a Vermont middle school. *Journal of School Health*, 81(1), 15-20.

[46] Kleinman, R. E., Hall, S., Green, H., Korzec-Ramirez, D., Patton, K., Pagano, M. E., & Murphy, J. M. (2002). Diet, breakfast, and academic performance in children. *Annals of Nutrition and Metabolism*, 46(Supplement 1), 24-30.

[47] Bartfeld, J., Kim, M., Ryu, J. H., & Ahn, H. (2009). The School Breakfast Program participation and impacts. *Contractor and Cooperator Report*, 54. Washington, DC: U.S. Department of Agriculture.

[48] Bartfeld, J. S., & Ahn, H. M. (2011). The School Breakfast Program strengthens household food security among low-income households with elementary school children. *Journal of Nutrition*, 141(3), 470-475.

[49] Bartfeld, J. S., & Ryu, J. H. (2011). The School Breakfast Program and breakfast-skipping among Wisconsin elementary school children. *Social Service Review*, 85(4), 619-634.

[50] Nord, M., & Romig, K. (2006). Hunger in the summer: seasonal food insecurity and the National School Lunch and Summer Food Service programs. *Journal of Children and Poverty*, 12(2), 141-158.

[51] Nalty, C., Sharkey, J., & Dean, W. (2013). School-based nutrition programs are associated with reduced child food insecurity over time among Mexican-origin mother-child dyads in Texas Border Colonias. *Journal of Nutrition*, 143, 708-713.

[52] Bhattacharya, J., Currie, J., & Haider, S. J. (2006). Breakfast of champions? The School Breakfast Program and the nutrition of children and families. *Journal of Human Resources*, 41(3), 445-466.

[53] Gleason, P., & Suitor, C. (2001). Children's diets in the mid-1990s: dietary intake and its relationship with school meal participation. *Special Nutrition Programs*, CN-01-CD1. Alexandria, VA: U.S. Department of Agriculture, Food and Nutrition Service, Office of Analysis, Nutrition and Evaluation.

[54] Clark, M. A., & Fox, M. K. (2009). Nutritional quality of the diets of U.S. public school children and the role of the school meal programs. *Journal of the American Dietetic Association*, 109(2 Supplement 1), S44-S56.

[55] Affenito, S. G., Thompson, D. R., Barton, B. A., Franko, D. L., Daniels, S. R., Obarzanek, E., Schreiber, G. B., & Striegel-Moore, R. H. (2005). Breakfast consumption by African-American and white adolescent girls correlates positively with calcium and fiber intake and negatively with body mass index. *Journal of the American Dietetic Association*, 105(6), 938-945.

[56] Affenito, S. G., Thompson, D., Dorazio, A., Albertson, A. M., Loew, A., & Holschuh, N. M. (2013). Ready-to-eat cereal consumption and the School Breakfast Program: relationship to nutrient intake and weight. *Journal of School Health*, 83(1), 28-35.

[57] Kerver, J. M., Yang, E. J., Obayashi, S., Bianchi, L., & Song, W. O. (2006). Meal and snack patterns are associated with dietary intake of energy and nutrients in US adults. *Journal of the American Dietetic Association*, 106(1), 46-53.

[58] Gleason, P. M., & Dodd, A. H. (2009). School breakfast program but not school lunch program participation is associated with lower body mass index. *Journal of the American Dietetic Association*, 109(2 Supplement 1), S118-S128.

[59] Millimet, D. L., Tchernis, R., & Husain, M. (2009). School nutrition programs and the incidence of childhood obesity. *Journal of Human Resources*, (3), 640-654.

[60] Millimet, D. L., & Tchernis, R. (2013). Estimation of treatment effects without an exclusion restriction: with an application to the analysis of the School Breakfast Program. *Journal of Applied Economics*, 28, 982-1017.

[61] Wang, S., Schwartz, M. B., Shebi, F. M., Read, M., Henderson, K. E., & Ickovics, J. R. (2016). School breakfast and body mass index: a longitudinal observational study of middle school students. *Pediatric Obesity*, published online ahead of print.

[62] Alexander, K. E., Ventura, E. E., Spruijt-Metz, D., Weigensberg, M. J., Goran, M. I., & Davis, J. N. (2009). Association of breakfast skipping with visceral fat and insulin indices in overweight Latino youth. *Obesity*, 17(8), 1528-1533.

[63] Affenito, S. G., Thompson, D. R., Barton, B. A., Franko, D. L., Daniels, S. R., Obarzanek, E., Schreiber, G. B., & Striegel-Moore, R. H. (2005). Breakfast consumption by African-American and white adolescent girls correlates positively with calcium and fiber intake and negatively with body mass index. *Journal of the American Dietetic Association*, 105(6), 938-945.

[64] Barton, B. A., Elderidge, A. L., Thompson, D., Affenito, S. G., Striegel-Moore, R. H., Franko, D. L., Albertson, A. M., & Crockett, S. J. (2005). The relationship of breakfast and cereal consumption to nutrient intake and body mass index: the National Heart, Lung, and Blood Institute Growth and Health Study. *Journal of the American Dietetic Association*, 105(9), 1383-1389.

[65] Deshmukh-Taskar, P. R., Nicklas, T. A., O'Neil, C. E., Keast, D. R., Radcliffe, J. D., & Cho, S. (2010). The relationship of breakfast skipping and type of breakfast consumption with nutrient intake and weight status in children and adolescents: the National Health and Nutrition Examination Survey 1999-2006. *Journal of the American Dietetic Association*, 110(6), 869-878.

[66] Fiore, H., Travis, S., Whalen, A., Auinger, P., & Ryan, S. (2006). Potentially protective factors associated with healthful body mass index in adolescents with obese and nonobese parents: a secondary data analysis of the third national health and nutrition examination survey, 1988-1994. *Journal of the American Dietetic Association*, 106(1), 55-64.

[67] Merten, M. J., Williams, A. L., & Shriver, L. H. (2009). Breakfast consumption in adolescence and young adulthood: parental presence, community context, and obesity. *Journal of the American Dietetic Association*, 109(8), 1384-1391.

[68] Niemeier, H. M., Raynor, H. A., Lloyd-Richardson, E. E., Rogers, M. L., & Wing, R. R. (2006). Fast food consumption and breakfast skipping: predictors of weight gain from adolescence to adulthood in a nationally representative sample. *Journal of Adolescent Health*, 39(6), 842-849.

[69] Timlin, M. T., Pereira, M. A., Story, M., & Neumark-Sztainer, D. (2008). Breakfast eating and weight change in a 5-year prospective analysis of adolescents: Project EAT (Eating Among Teens). *Pediatrics*, 121(3), e638-645.

[70] Wojcicki, J. M., Schwartz, N., Jiménez-Cruz, A., Bacardi-Gascon, M., & Heyman, M. B. (2012). Acculturation, dietary practices and risk for childhood obesity in an ethnically heterogeneous population of Latino school children in the San Francisco bay area. *Journal of Immigrant and Minority Health*, 14(4), 533-539.

[71] Blondin, S. A., Anzman-Frasca, S., Djang, H. C., & Economos, C. D. (2016). Breakfast consumption and adiposity among children and adolescents: an updated review of the literature. *Pediatric Obesity*, 11(5), 333-348.

[72] Bernstein, L. S., McLaughlin, J. E., Crepinsek, M. K., & Daft, L. M. (2004). Evaluation of the School Breakfast Program Pilot Project: final report. *Nutrition Assistance Program Report Series*, CN-04-SBP. Alexandria, VA: U.S. Department of Agriculture, Food and Nutrition Service, Office of Analysis, Nutrition, and Evaluation. (The findings on school nurse visits were only observed for the 2001-2002 school year in this report.)

RESEARCH BRIEF: BREAKFAST FOR HEALTH

Food Research & Action Center

School Breakfast Participation Improves Children's Dietary Intake

- School breakfast participants are more likely to consume diets that are adequate or exceed standards for important vitamins and minerals (e.g., vitamin A, vitamin C, calcium, phosphorous).[1,2,3]
- Children and adolescents who skip breakfast tend to have poorer nutrient intakes than those who eat breakfast.[4,5] Eating breakfast regularly has been linked with greater intake of fiber, calcium, iron, vitamin C, and other vitamins and minerals, and lower intake of fat, cholesterol, and sodium.[6,7,8]
- A recent literature review concludes that the new school nutrition standards improve nutrition-related outcomes among students, especially in terms of improving fruit and vegetable selection and consumption.[9]
- Children who participate in school breakfast are more likely to consume fruit and milk at breakfast.[10]
- Low-income children who eat school breakfast have better overall diet quality than those who eat breakfast elsewhere or skip breakfast.[11] Similarly, low-income students who eat both school breakfast and lunch have significantly better overall diet quality than low-income students who do not eat school meals.[12] An improvement in dietary quality also may extend to the family members of children with access to the breakfast program.[13]

School Breakfast Decreases the Risk of Food Insecurity

- School breakfast offered at no cost to all students* may eliminate disparities between food-secure and food-insecure children in terms of eating breakfast at all.[14]
- Students with improved nutrient intake as a result of a program that offers school breakfast at no cost to all students report decreases in symptoms of hunger.[15]
- Access to school breakfast decreases the risk of marginal food insecurity and breakfast skipping, especially for low-income children.[16,17,18]
- Rates of food insecurity among children are higher in the summer — a time when many do not have access to the good nutrition provided by the school meal programs available during the academic year.[19,20]

School Breakfast May Protect Against Childhood Obesity

- School breakfast participation is associated with a lower body mass index (BMI, an indicator of excess body fat), lower probability of being overweight, and lower probability of obesity.[21,22,23,24]
- Food-insecure girls participating in the school lunch, school breakfast, or Supplemental Nutrition Assistance (SNAP, or food stamps) programs (or all three programs combined) have a lower risk of being overweight compared to food-insecure girls from non-participating households.[25]
- Participation in federally funded meals provided in child care, preschool, school, or summer settings is associated with a lower BMI among young, low-income children.[26]
- Children and adolescents who eat breakfast have more favorable weight-related outcomes (e.g., lower BMI, lower waist circumference, lesser likelihood of being chronically obese, decreased risk for obesity) in the short term and long term than those who skip breakfast.[27,28,29,30,31,32,33,34,35,36]

*Offering breakfast at no cost to all students is sometimes referred to as "universal breakfast" or "universal-free breakfast." The program helps remove the stigma for low-income children of participation in school breakfast and thereby increases participation among students generally, but particularly low-income students.

- Increasing participation in the federal nutrition programs — including school breakfast — is a healthy eating and childhood obesity prevention strategy recommended by two Institute of Medicine (IOM) committees and the White House Task Force on Childhood Obesity.[37,38,39]

School Breakfast Participation Protects Against Other Negative Health Outcomes

- Breakfast skipping among children and adolescents is associated with a number of poor health outcomes and health-compromising behaviors, including higher blood cholesterol and insulin levels, smoking, alcohol use, physical inactivity, disordered eating, and unhealthy weight management practices.[40,41,42,43,44,45]
- School breakfast, including breakfast offered at no cost to all students, has been linked with fewer visits to the school nurse, particularly in the morning.[46]
- School breakfast participation, especially breakfast offered at no cost to all students, positively impacts children's mental health, including reductions in behavioral problems, anxiety, and depression.[47,48]
- Food insecurity is associated with some of the most costly health problems in the U.S., including diabetes, heart disease, and depression.[49,50,51,52,53] Children experiencing hunger are more likely to have lower physical functioning, more frequent stomachaches and headaches, mental health problems (e.g., depression, anxiety, behavioral problems), and to be in poorer health.[54,55,56,57,58,59,60]

School Breakfast Helps Improve Student Academic Performance and Behavior; Skipping Breakfast Impairs Development and Learning†

- Students who participate in school breakfast show improved attendance, behavior, and academic performance as well as decreased tardiness.[61,62]
- Students who eat breakfast the morning of a standardized test have significantly higher scores in spelling, reading, and math, compared to those who do not eat breakfast.[63]
- Students who are undernourished have poorer cognitive functioning when they miss breakfast.[64]
- Children and adolescents experiencing hunger have lower math scores, poorer grades, and are more likely to repeat a grade.[65,66]

Breakfast in the Classroom Programs‡ and Programs Offering Breakfast at no Cost to all Children in the Cafeteria Yield Other Positive Results†

- Programs offering breakfast at no cost to all students and breakfast in the classroom boost student breakfast participation.[67,68,69,70,71,72]
- Breakfast in the classroom is associated with more students eating breakfast as well as better overall dietary quality.[73]
- Student math and reading achievement test scores improve when breakfast is moved out of the cafeteria and into the classroom.[74]
- Students attending schools that offer breakfast at no cost to all students are more likely to consume a nutritionally substantive breakfast and to consume significantly more calcium, magnesium, phosphorus, fruit, and dairy products at breakfast, when compared to students from schools with a traditional means-tested school breakfast in the cafeteria program.[75]
- Children who increase their school breakfast participation as a result of a school breakfast program offered at no cost to all students show greater improvements in math scores, attendance, punctuality, depression, anxiety, and hyperactivity than children whose participation remains unchanged or decreases.[76]

†For more information, read FRAC's *Breakfast for Learning* brief available at www.frac.org.

‡Breakfast in the classroom programs are an increasingly popular alternative to traditional, before-the-bell, cafeteria-based breakfast programs. Breakfast is brought in from the kitchen in containers that keep dishes at the right temperature, or is picked up from carts in the hallways as students enter class. Typically this breakfast is offered at no cost to all students. Such programs boost school breakfast participation and remove the stigma associated with participation.

This brief was originally prepared in September 2011 and updated in the spring of 2014 and October 2016 by FRAC's Heather Hartline-Grafton, DrPH, RD, Senior Nutrition Policy and Research Analyst.

Endnotes

[1] Bhattacharya, J., Currie, J., & Haider, S. J. (2006). Breakfast of champions? The School Breakfast Program and the nutrition of children and families. *Journal of Human Resources*, 41(3), 445-466.

[2] Clark, M. A., & Fox, M. K. (2009). Nutritional quality of the diets of U.S. public school children and the role of the school meal programs. *Journal of the American Dietetic Association*, 109(2 Supplement 1), S44-S56.

[3] Gleason, P., & Suitor, C. (2001). Children's diets in the mid-1990s: dietary intake and its relationship with school meal participation. *Special Nutrition Programs*, CN-01-CD1. Alexandria, VA: U.S. Department of Agriculture, Food and Nutrition Service, Office of Analysis, Nutrition and Evaluation.

[4] Deshmukh-Taskar, P. R., Nicklas, T. A., O'Neil, C. E., Keast, D. R., Radcliffe, J. D., & Cho, S. (2010). The relationship of breakfast skipping and type of breakfast consumption with nutrient intake and weight status in children and adolescents: the National Health and Nutrition Examination Survey 1999-2006. *Journal of the American Dietetic Association*, 110(6), 869-878.

[5] Rampersaud, G. C., Pereira, M. A., Girard, B. L., Adams, J., & Metzl, J. D. (2005). Breakfast habits, nutritional status, body weight, and academic performance in children and adolescents. *Journal of the American Dietetic Association*, 105(5), 743-760.

[6] Affenito, S. G., Thompson, D. R., Barton, B. A., Franko, D. L., Daniels, S. R., Obarzanek, E., Schreiber, G. B., & Striegel-Moore, R. H. (2005). Breakfast consumption by African-American and white adolescent girls correlates positively with calcium and fiber intake and negatively with body mass index. *Journal of the American Dietetic Association*, 105(6), 938-945.

[7] Affenito, S. G., Thompson, D., Dorazio, A., Albertson, A. M., Loew, A., & Holschuh, N. M. (2013). Ready-to-eat cereal consumption and the School Breakfast Program: relationship to nutrient intake and weight. *Journal of School Health*, 83(1), 28-35.

[8] Kerver, J. M., Yang, E. J., Obayashi, S., Bianchi, L., & Song, W. O. (2006). Meal and snack patterns are associated with dietary intake of energy and nutrients in US adults. *Journal of the American Dietetic Association*, 106(1), 46-53.

[9] Hartline-Grafton, H. (2016). *Research Shows that the School Nutrition Standards Improve the School Nutrition Environment and Student Outcomes*. Washington, DC: Food Research & Action Center.

[10] Condon, E. M., Crepinsek, M. K., & Fox, M. K. (2009). School meals: types of foods offered to and consumed by children at lunch and breakfast. *Journal of the American Dietetic Association*, 109(2 Supplement 1), S67-S78.

[11] Basiotis, P. P., Lino, M., & Anand, R. S. (1999). Eating breakfast greatly improves school children's diet quality. *Nutrition Insight*, 15. Alexandria, VA: U.S. Department of Agriculture, Center for Nutrition Policy and Promotion.

[12] Hanson, K. L., & Olson, C. M. (2013). School meals participation and weekday dietary quality were associated after controlling for weekend eating among U.S. school children aged 6 to 17 years. *Journal of Nutrition*, 143, 714-721.

[13] Bhattacharya, J., Currie, J., & Haider, S. J. (2006). Breakfast of champions? The School Breakfast Program and the nutrition of children and families. *Journal of Human Resources*, 41(3), 445-466.

[14] Khan, S., Pinckney, R. G., Keeney, D., Frankowski, B., & Carney, J. K. (2011). Prevalence of food insecurity and utilization of food assistance program: an exploratory survey of a Vermont middle school. *Journal of School Health*, 81(1), 15-20.

[15] Kleinman, R. E., Hall, S., Green, H., Korzec-Ramirez, D., Patton, K., Pagano, M. E., & Murphy, J. M. (2002). Diet, breakfast, and academic performance in children. *Annals of Nutrition and Metabolism*, 46(Supplement 1), 24-30.

[16] Bartfeld, J., Kim, M., Ryu, J. H., & Ahn, H. (2009). The School Breakfast Program participation and impacts. *Contractor and Cooperator Report*, 54. Washington, DC: U.S. Department of Agriculture.

[17] Bartfeld, J. S., & Ahn, H. M. (2011). The School Breakfast Program strengthens household food security among low-income households with elementary school children. *Journal of Nutrition*, 141(3), 470-475.

[18] Bartfeld, J. S., & Ryu, J. H. (2011). The School Breakfast Program and breakfast-skipping among Wisconsin elementary school children. *Social Service Review*, 85(4), 619-634.

[19] Nord, M., & Romig, K. (2006). Hunger in the summer: seasonal food insecurity and the National School Lunch and Summer Food Service programs. *Journal of Children and Poverty*, 12(2), 141-158.

[20] Nalty, C., Sharkey, J., & Dean, W. (2013). School-based nutrition programs are associated with reduced child food insecurity over time among Mexican-origin mother-child dyads in Texas Border Colonias. *Journal of Nutrition*, 143, 708-713.

[21] Gleason, P. M., & Dodd, A. H. (2009). School breakfast program but not school lunch program participation is associated with lower body mass index. *Journal of the American Dietetic Association*, 109(2 Supplement 1), S118-S128.

[22] Millimet, D. L., Tchernis, R., & Husain, M. (2010). School nutrition programs and the incidence of childhood obesity. *Journal of Human Resources*, 45(3), 640-654.

[23] Millimet, D. L., & Tchernis, R. (2013). Estimation of treatment effects without an exclusion restriction: with an application to the analysis of the School Breakfast Program. *Journal of Applied Economics*, 28, 982-1017.

[24] Wang, S., Schwartz, M. B., Shebi, F. M., Read, M., Henderson, K. E., & Ickovics, J. R. (2016). School breakfast and body mass index: a longitudinal observational study of middle school students. *Pediatric Obesity*, published online ahead of print.

[25] Jones, S. J., Jahns, L., Laraia, B. A., & Haughton, B. (2003). Lower risk of overweight in school-aged food insecure girls who participate in food assistance: results from the Panel Study of Income Dynamics Child Development Supplement. *Archives of Pediatric and Adolescent Medicine*, 157(8), 780-784.

[26] Kimbro, R. T., & Rigby, E. (2010). Federal food policy and childhood obesity: a solution or part of the problem? *Health Affairs*, 29(3), 411-418.

[27] Alexander, K. E., Ventura, E. E., Spruijt-Metz, D., Weigensberg, M. J., Goran, M. I., & Davis, J. N. (2009). Association of breakfast skipping with visceral fat and insulin indices in overweight Latino youth. *Obesity*, 17(8), 1528-1533.

[28] Affenito, S. G., Thompson, D., Dorazio, A., Albertson, A. M., Loew, A., & Holschuh, N. M. (2013). Ready-to-eat cereal consumption and the School Breakfast Program: relationship to nutrient intake and weight. *Journal of School Health*, 83(1), 28-35.

[29] Barton, B. A., Elderidge, A. L., Thompson, D., Affenito, S. G., Striegel-Moore, R. H., Franko, D. L., Albertson, A. M., & Crockett, S. J. (2005). The relationship of breakfast and cereal consumption to nutrient intake and body mass index: the National Heart, Lung, and Blood Institute Growth and Health Study. *Journal of the American Dietetic Association*, 105(9), 1383-1389.

[30] Deshmukh-Taskar, P. R., Nicklas, T. A., O'Neil, C. E., Keast, D. R., Radcliffe, J. D., & Cho, S. (2010). The relationship of breakfast skipping and type of breakfast consumption with nutrient intake and weight status in children and adolescents: the National Health and Nutrition Examination Survey 1999-2006. *Journal of the American Dietetic Association*, 110(6), 869-878.

[31] Fiore, H., Travis, S., Whalen, A., Auinger, P., & Ryan, S. (2006). Potentially protective factors associated with healthful body mass index in adolescents with obese and nonobese parents: a secondary data analysis of the third national health and nutrition examination survey, 1988-1994. *Journal of the American Dietetic Association*, 106(1), 55-64.

[32] Merten, M. J., Williams, A. L., & Shriver, L. H. (2009). Breakfast consumption in adolescence and young adulthood: parental presence, community context, and obesity. *Journal of the American Dietetic Association*, 109(8), 1384-1391.

[33] Niemeier, H. M., Raynor, H. A., Lloyd-Richardson, E. E., Rogers, M. L., & Wing, R. R. (2006). Fast food consumption and breakfast skipping: predictors of weight gain from adolescence to adulthood in a nationally representative sample. *Journal of Adolescent Health*, 39(6), 842-849.

[34] Timlin, M. T., Pereira, M. A., Story, M., & Neumark-Sztainer, D. (2008). Breakfast eating and weight change in a 5-year prospective analysis of adolescents: Project EAT (Eating Among Teens). *Pediatrics*, 121(3), e638-645.

[35] Wojcicki, J. M., Schwartz, N., Jiménez-Cruz, A., Bacardi-Gascon, M., & Heyman, M. B. (2012). Acculturation, dietary practices and risk for childhood obesity in an ethnically heterogeneous population of Latino school children in the San Francisco bay area. *Journal of Immigrant and Minority Health*, 14(4), 533-539.

[36] Blondin, S. A., Anzman-Frasca, S., Djang, H. C., & Economos, C. D. (2016). Breakfast consumption and adiposity among children and adolescents: an updated review of the literature. *Pediatric Obesity*, 11(5), 333-348.

[37] Institute of Medicine. (2009). *Local Government Actions to Prevent Childhood Obesity*. Washington, DC: The National Academies Press.

[38] Institute of Medicine. (2011). *Early Childhood Obesity Prevention Policies*. Washington, DC: The National Academies Press.

[39] White House Task Force on Childhood Obesity. (2010). *Solving the Problem of Childhood Obesity within a Generation*. Available at: http://www.letsmove.gov/sites/letsmove.gov/files/TaskForce_on_Childhood_Obesity_May2010_FullReport.pdf. Accessed on October 16, 2016.

[40] Cohen, B., Evers, S., Manske, S., Bercovitz, K., & Edward, H. G. (2003). Smoking, physical activity and breakfast consumption among secondary school students in a southwestern Ontario community. *Canadian Journal of Public Health*, 94(1), 41-44.

[41] Kapantais, E., Chala, E., Kaklamanou, D., Lanaras, L., Kaklamanou, M., & Tzotzas, T. (2011). Breakfast skipping and its relation to BMI and health-compromising behaviours among Greek adolescents. *Public Health Nutrition*, 14(1), 101-108.

[42] Keski-Rahkonen, A., Kaprio, J., Rissanen, A., Virkkunen, M., & Rose, R. J. (2003). Breakfast skipping and health-compromising behaviors in adolescents and adults. *European Journal of Clinical Nutrition*, 57(7), 842-853.

[43] Schembre, S. M., Wen, C. K., Davis, J. N., Shen, E., Nguyen-Rodriguez, S. T., Belcher, B. R., Hsu, Y. W., Weigensberg, M. J., Goran, M. I., & Spruijt-Metz, D. (2013). Eating breakfast more frequently is cross-sectionally associated with greater physical activity and lower levels of adiposity in overweight Latina and African American girls. *American Journal of Clinical Nutrition*, 98(2), 275-281.

[44] Smith, K. J., Gall, S. L., McNaughton, S. A., Blizzard, L., Dwyer, T., & Venn, A. J. (2010). Skipping breakfast: longitudinal associations with cardiometabolic risk factors in the Childhood Determinants of Adult Health Study. *American Journal of Clinical Nutrition*, 92(6), 1316-1325.

[45] Zullig, K., Ubbes, V. A., Pyle, J., & Valois, R. F. (2006). Self-reported weight perceptions, dieting behavior, and breakfast eating among high school adolescents. *Journal of School Health*, 76(3), 87-92.

[46] Bernstein, L. S., McLaughlin, J. E., Crepinsek, M. K., & Daft , L. M. (2004). Evaluation of the School Breakfast Program Pilot Project: final report. *Nutrition Assistance Program Report Series*, CN-04-SBP. Alexandria, VA: U.S. Department of Agriculture, Food and Nutrition Service, Office of Analysis, Nutrition, and Evaluation. (The findings on school nurse visits were only observed for the 2001-2002 school year in this report.)

[47] Kleinman, R. E., Hall, S., Green, H., Korzec-Ramirez, D., Patton, K., Pagano, M. E., & Murphy, J. M. (2002). Diet, breakfast, and academic performance in children. *Annals of Nutrition and Metabolism*, 46(Supplement 1), 24-30.

[48] Murphy, J. M., Pagano, M. E., Nachmani, J., Sperling, P., Kane, S., & Kleinman, R. E. (1998). The relationship of school breakfast to psychosocial and academic functioning: cross-sectional and longitudinal observations in an inner-city school sample. *Archives of Pediatrics and Adolescent Medicine*, 152(9), 899-907.

[49] Gundersen, C., & Ziliak, J. P. (2015). Food insecurity and health outcomes. *Health Affairs*, 34(11), 1830-1839.

[50] Fitzgerald, N., Hromi-Fiedler, A., Segura-Pérez, S., & Pérez-Escamilla, R. (2011). Food insecurity is related to increased risk of type 2 diabetes among Latinas. *Ethnicity and Disease*, 21(3), 328-334.

[51] Shin, J. I., Bautista, L. E., Walsh, M. C., Malecki, K. C., & Nieto, F. J. (2015). Food insecurity and dyslipidemia in a representative population-based sample in the US. *Preventive Medicine*, 77, 186-190.

[52] Seligman, H. K., Laraia, B. A., & Kushel, M. B. (2010). Food insecurity is associated with chronic disease among low-income NHANES participants. *Journal of Nutrition*, 140(2), 304-310.

[53] Leung, C. W., Epel, E. S., Willett, W. C., Rimm, E. B., & Laraia, B. A. (2015). Household food insecurity is positively associated with depression among low-income Supplemental Nutrition Assistance Program participants and income-eligible nonparticipants. *Journal of Nutrition*, 145(3), 622-627.

[54] Alaimo, K., Olson, C. M., Frongillo, E. A., Jr., & Briefel, R. R. (2001). Food insufficiency, family income, and health in U.S. preschool and school-aged children. *American Journal of Public Health*, 91(5), 781-786.

[55] Slack, K. S., & Yoo, J. (2005). Food hardship and child behavior problems among low-income children. *Social Service Review*, 79(3), 511–536.

[56] McLaughlin, K. A., Green, J. G., Alegría, M., Jane Costello, E., Gruber, M. J., Sampson, N. A., & Kessler, R. C. (2012). Food insecurity and mental disorders in a national sample of U.S. adolescents. *Journal of the American Academy of Child and Adolescent Psychiatry*, 51(12), 1293-1303.

[57] Ryu, J. H., & Bartfeld, J. S. (2012). Household food insecurity during childhood and subsequent health status: the early childhood longitudinal study - kindergarten cohort. *American Journal of Public Health*, 102(11), e50-e55.

[58] Casey, P. H., Szeto, K. L., Robbins, J. M., Stuff , J. E., Connell, C. , Gossett, J. M., & Simpson, P. M. (2005). Child health-related quality of life and household food security. *Archives of Pediatrics and Adolescent Medicine*, 159(1), 51-56.

[59] Goldman, N., Ettinger de Cuba, S., Sheward, R., Cutts, D., & Coleman, S. (2014). *Food Security Protects Minnesota Children's Health*. Boston, MA: Children's HealthWatch.

[60] Kimbro, R. T., & Denney, J. T. (2015). Transitions into food insecurity associated with behavioral problems and worse overall health among children. *Health Affairs*, 34(11), 1949-1955.

[61] Murphy, J. M. (2007). Breakfast and learning: an updated review. *Journal of Current Nutrition and Food Science*, 1, 3-36.

[62] Basch, C. E. (2011). Breakfast and the achievement gap among urban minority youth. *Journal of School Health*, 81(10), 635-640.

[63] Ptomey, L. T., Steger, F. L., Schubert, M. M., Lee, J., Willis, E. A., Sullivan, D. K., Szabo-Reed, A. N., Washburn, R. A., & Donnelly, J. E. (2016). Breakfast intake and composition is associated with superior academic achievement in elementary schoolchildren. *Journal of the American College of Nutrition*, 35(4), 326-333.

[64] Taras, H. (2005). Nutrition and student performance at school. *Journal of School Health*, 75(6), 199-213.

[65] Alaimo, K., Olson, C. M., & Frongillo, E. A., Jr. (2001). Food insufficiency and American school-aged children's cognitive, academic and psychosocial development. *Pediatrics*, 108(1), 44-53.

[66] Shanafelt, A., Hearst, M. O., Wang, Q., & Nanney, M. S. (2016). Food insecurity and rural adolescent personal health, home, and academic environments. *Journal of School Health*, 86(6), 472-480.

[67] Bernstein, L. S., McLaughlin, J. E., Crepinsek, M. K., & Daft, L. M. (2004). Evaluation of the School Breakfast Program Pilot Project: final report. *Nutrition Assistance Program Report Series*, CN-04-SBP. Alexandria, VA: U.S. Department of Agriculture, Food and Nutrition Service, Office of Analysis, Nutrition, and Evaluation. (The findings on school nurse visits were only observed for the 2001-2002 school year in this report.).

[68] Bartfeld, J., Kim, M., Ryu, J. H., & Ahn, H. (2009). The School Breakfast Program participation and impacts. *Contractor and Cooperator Report*, 54. Washington, DC: U.S.

[69] Murphy, J. M., Pagano, M. E., Nachmani, J., Sperling, P., Kane, S., & Kleinman, R. E. (1998). The relationship of school breakfast to psychosocial and academic functioning: cross-sectional and longitudinal observations in an inner-city school sample. *Archives of Pediatrics and Adolescent Medicine*, 152(9), 899-907.

[70] Nanney, M. S., Olaleye, T. M., Wang, Q., Motyka, E., & Klund-Schubert, J. (2011). A pilot study to expand the school breakfast program in one middle school. *Translational Behavioral Medicine*, 1(3), 436-442.

[71] Corcoran, S. P., Elbel, B., & Schwartz, A. E. (2016). The effect of breakfast in the classroom on obesity and academic performance: evidence from New York City. *Journal of Policy Analysis and Management*, 35(3), 509-532.

[72] Anzman-Frasca, S., Djang, H. C., Halmo, M. M., Dolan, P. R., & Economos, C. D. (2015). Estimating impacts of a breakfast in the classroom program on school outcomes. *JAMA Pediatrics*, 169(1), 71-77.

[73] Ritchie, L. D., Rosen, N. J., Fenton, K., Au, L. E., Goldstein, L. H., & Shimada, T. (2015). School breakfast policy is associated with dietary intake of fourth- and fifth-grade students. *Journal of the Academy of Nutrition and Dietetics*, 116(3), 449-457.

[74] Imberman, S. A., & Kugler, A. D. (2014). The effect of providing breakfast in class on student performance. *Journal of Policy Analysis and Management*, 33(3), 669-699.

[75] Crepinsek, M. K., Singh, A., Bernstein, L. S., & McLaughlin, J. E. (2006). Dietary effects of universal-free school breakfast: findings from the evaluation of the school breakfast program pilot project. *Journal of the American Dietetic Association*, 106(11), 1796-1803.

[76] Murphy, J. M., Pagano, M. E., Nachmani, J., Sperling, P., Kane, S., & Kleinman, R. E. (1998). The relationship of school breakfast to psychosocial and academic functioning: cross-sectional and longitudinal observations in an inner-city school sample. *Archives of Pediatrics and Adolescent Medicine*, 152(9), 899-907.

RESEARCH BRIEF

The Connections Between Food Insecurity, the Federal Nutrition Programs, and Student Behavior

FRAC
Food Research & Action Center

Students who live in food-insecure* households can have multiple disadvantages in school when compared to peers from food-secure households. Food insecurity negatively impacts the social, emotional, and behavioral development of school-age children and adolescents, and exacerbates their risk for behavioral issues that interfere with learning and achieving academic success.[1] Access to good nutrition, including access to the Federal Nutrition Programs,† such as the School Breakfast Program and the Afterschool Nutrition Programs, is a key strategy to support positive development and behavior among students facing food insecurity.

This brief highlights research on the connections between food insecurity and behavior, and the critical role that the Federal Nutrition Programs play when addressing these issues among school-age children and adolescents.

Food insecurity inhibits students' social skills.

- Food insecurity impairs a child's ability to develop interpersonal relationships (e.g., form and maintain friendships, get along with people who are different from them, comfort or help other children); maintain self-control (e.g., respect others and their belongings, control one's temper, respond appropriately to peer pressure); and welcome learning opportunities (e.g., attentiveness, task persistence, eagerness to learn, flexibility).[2]
- Children who experience hunger are seven times more likely to engage in physical altercations.[3]
- Children from food-insecure households have lower levels of self-control in early childhood and higher levels of delinquency during late childhood, compared to their peers from food-secure households.[4]
- Teachers are more likely to report poor interpersonal skills, internalizing behaviors, and a decrease in self-control among students who have become food-insecure.[5] (Examples of internalizing behaviors include fearfulness, anxiety, and withdrawal.)
- Female students that live in households that become food insecure have impaired social skills development, such as experiencing loneliness and a diminished ability to get along with other children.[6]

* Food insecurity is a term defined by the United States Department of Agriculture (USDA) that indicates that the availability of nutritionally adequate and safe food, or the ability to acquire such food, is limited or uncertain for a household.

†The federal nutrition programs include the Supplemental Nutrition Assistance Program (SNAP); Special Supplemental Nutrition Program for Women, Infants, and Children (WIC); National School Lunch Program (NSLP); School Breakfast Program (SBP); Child and Adult Care Food Program (CACFP); Summer Food Service Program (SFSP); and Afterschool Nutrition Programs.

Toxic Stress and Adverse Childhood Experiences

Growing up in poverty is associated with toxic stress, which is chronic stress that can have enormous impacts on child development and health.[39,40,41] Under prolonged stress, stress hormone levels become excessively high for long periods of time. This leads to a "wear and tear" on the brain and body, referred to as allostatic load. Toxic stress can inhibit normal brain and physical development and metabolic processes among children, making them more susceptible to behavior and learning impairments and physical and mental illness later in life.[42] Toxic stress in children often results from strong, repeated, or prolonged exposure to adversity, such as adverse childhood experiences (ACEs).[43] ACEs are potentially traumatic experiences, such as economic hardship, loss of a parent due to divorce, witnessing domestic violence, or the incarceration of a parent. ACEs are more common among children living in poverty.[44] Exposure to more ACEs puts children at greater risk for health and economic problems later in life.[45,46] For instance, one study found that female caregivers' ACEs were associated with current household and child food-insecurity status.[47]

Food insecurity increases students' risk for additional mental health issues and challenges.

- Food insecurity is strongly correlated to higher levels of anxiety and irritability among children.[7]
- As the severity of household food insecurity increases, so does the likelihood that children and adolescents will develop a mental disorder.[8]
- Teens experiencing hunger are more likely to have difficulty getting along with peers, get suspended from school, see a psychologist, have suicidal tendencies, and struggle with depression, as compared to their food-secure peers.[9,10]
- When food insecurity worsens for a teenager, the risk of developing a mood disorder, such as depression or bipolar disorder, increases.[11]
- Chronic stress (commonly referred to as toxic stress) among children experiencing chronic poverty and food insecurity can lead to delays in brain development and produce anxiety, impaired mood control, and emotional behavioral disorders.[12,13,14]

Students struggling with food insecurity may have difficulty being engaged in the classroom.

- Food-insecure students are more likely to be apathetic, withdrawn, non-responsive, and have decreased motivation in the classroom.[15]
- Children experiencing hunger are more likely to be tardy or absent from school.[16]
- Students who experience income shocks (i.e., severe fluctuations of income) at home are more likely to become disengaged in the school environment.[17]

The federal nutrition programs reduce food insecurity among school-age children and adolescents.

- Access to school breakfast decreases the risk of marginal food security and breakfast skipping, especially for low-income children.[18,19,20] School breakfast availability also reduces low food security and very low food security (the most severe level of food insecurity) among elementary school children.[21]

- According to national data, free or reduced-price school lunches reduce food insecurity prevalence by at least 3.8 percent.[22]
- School lunch participation is associated with a 14 percent reduction in the risk of food insufficiency[‡] among households with at least one child receiving a free or reduced-price school lunch.[23]
- Rates of food insecurity and food insufficiency among children are higher in the summer — a time when students do not have access to the school meals that are available during the academic year.[24,25,26] Several studies demonstrate that greater summer meal availability or accessibility has beneficial effects on food insecurity, especially on very low food security.[27,28]
- Children in households that have participated in the Supplemental Nutrition Assistance Program (SNAP) for six months are approximately one-third less likely to be food insecure than children in households recently approved for SNAP, but not yet receiving it.[29]
- Among low-income families with children, SNAP receipt reduces the probability of very low food security for households and for children.[30]

Participation in the federal nutrition programs, especially school breakfast,[✣] can improve behavior in school.

- Students who participate in school breakfast show improved behavior, attendance, and academic performance as well as decreased tardiness.[31,32]
- School breakfast participation, especially breakfast offered at no cost to all students, positively impacts children's mental health, including reductions in hyperactivity, anxiety, and depression.[33,34]
- Providing students with breakfast in the classroom is associated with fewer disciplinary office referrals, lower tardy rates, and improved attendance rates.[35,36]
- Schools that do not operate an afterschool snack program report a slightly larger increase in disciplinary events in the last week of the month, as compared to schools that provide an afterschool snack.[37] The last week of the month is when SNAP benefits often are running low or depleted for low-income households.
- Similarly, disciplinary infractions increase at the end of the SNAP benefit cycle for students in SNAP and non-SNAP households. However, the increase is larger for students from SNAP households. This means that students in SNAP households have lower rates of disciplinary issues earlier in the month, in contrast to later in the month when SNAP benefits are most likely exhausted.[38]

This brief was prepared by FRAC's Qwamel Hanks, NDTR, School Breakfast Project Associate; Heather Hartline-Grafton, DrPH, RD, Senior Nutrition Policy and Research Analyst; and former intern, Emily Johnson.

[‡] Food insufficiency refers to an inadequate amount of food intake due to lack of money or resources.

[✣] For more information on the benefits of school breakfast, see FRAC's research briefs, Breakfast for Learning and Breakfast for Health, at www.frac.org.

Endnotes

[1] Shankar, P., Chung, R., & Frank, D. A. (2017). Association of food insecurity with children's behavioral, emotional, and academic outcomes: a systematic review. *Journal of Developmental and Behavioral Pediatrics*, 38(2), 135–150.

[2] Howard, L. L. (2011). Does food insecurity at home affect non-cognitive performance at school? A longitudinal analysis of elementary student classroom behavior. *Economics of Education Review*, 30, 157–176.

[3] Kleinman, R. E., Murphy, J. M., Little, M., Pagano, M., Wehler, C. A., Regal, K., & Jellinek, M. S. (1998). Hunger in children in the United States: potential behavioral and emotional correlates. *Pediatrics*, 101, 3.

[4] Jackson, D. B., Newsome, J., Vaughn, M. G., & Johnson, K. R. (2017). Considering the role of food insecurity in low self-control and early delinquency. *Journal of Criminal Justice*, published online ahead of print.

[5] Kimbro, R., & Denney, J. (2015). Transitions into food insecurity associated with behavioral problems and worse overall health among children. *Health Affairs*, 34, 1949-1955.

[6] Jyoti, D. F., Frongillo, E. A., & Jones, S. J. (2005). Food insecurity affects school children's academic performance, weight gain, and social skills. *The Journal of Nutrition*, 12, 2831–2839.

[7] Kleinman, R. E., Murphy, J. M., Little, M., Pagano, M., Wehler, C. A., Regal, K., & Jellinek, M. S. (1998). Hunger in children in the United States: potential behavioral and emotional correlates. *Pediatrics*, 101, 3.

[8] Burke, M. P., Martini, L. M., Cayir, E., Hartline-Grafton, H. L., & Meade, R. L. (2016). Severity of household food insecurity is positively associated with mental disorders among children and adolescents in the United States. *Journal of Nutrition*, 146(1), 2019–2026.

[9] Alaimo, K., Olson, C. M., & Frongillo, E. A., Jr. (2001). Food insufficiency and American school-aged children's cognitive, academic and psychosocial development. *Pediatrics*, 108(1), 44–53.

[10] Alaimo, K., C.M. Olson & E.A. Frongillo. (2002). Family food insufficiency, but not low family income, is positively associated with dysthymia and suicide symptoms in adolescents. *American Journal of Nutrition,* 132, 719–725.

[11] McLaughlin, K. A., Green, J. G., Alegria, M., Gruber, M. J., Sampson, N. A., & Kessler, R. C. (2012). Food insecurity and mental disorders in a national sample of U.S. adolescents. *American Academy of Child Adolescent Psychiatry*, 51, 1293–1303.

[12] Holtz, C. A., & Fox, R. A. (2012). Behavior problems in young children from low-income families: The development of a new screening tool. *Infant Mental Health Journal*, 33, 82–94.

[13] Shonkoff, J. P., & Garner, A. S. (2012). The lifelong effects of early childhood adversity and toxic stress. *Pediatrics*, 129(1), e232–e246.

[14] Middlebrooks, J. S., & Augdage, N. C. (2008). *The Effects of Childhood Stress on Health Across the Lifespan*. Atlanta, GA: Centers for Disease Control and Prevention, National Center for Injury Prevention and Control.

[15] Ashiabi, G. (2005). Household food insecurity and children's school engagement. *Journal of Child Poverty*, 11(1), 3–17.

[16] Murphy, J. M., Pagano, M. E., Nachmani, J., Sperling, P., Kane, S., & Kleinman, R. E. (1998). The relationship of school breakfast to psychosocial and academic functioning: cross-sectional and longitudinal observations in an inner-city school sample. *Archives of Pediatrics and Adolescent Medicine*, 152(9), 899–907.

[17] Gennetian, L., Wolf, S., Hill, H. D., & Morris, P. A. (2015). Intrayear household income dynamics and adolescent school behavior. *Demography*, 52, 445–483.

[18] Bartfeld, J., Kim, M., Ryu, J. H., & Ahn, H. (2009). The School Breakfast Program participation and impacts. *Contractor and Cooperator Report*, 54. Washington, DC: U.S. Department of Agriculture.

[19] Bartfeld, J. S., & Ahn, H. M. (2011). The School Breakfast Program strengthens household food security among low-income households with elementary school children. *Journal of Nutrition*, 141(3), 470–475.

[20] Bartfeld, J. S., & Ryu, J. H. (2011). The School Breakfast Program and breakfast-skipping among Wisconsin elementary school children. *Social Service Review*, 85(4), 619–634.

[21] Fletcher, J. M., & Frisvold, D. E. (2017). The relationship between the School Breakfast Program and food insecurity. *Journal of Consumer Affairs*, published online ahead of print.

[22] Gundersen, C., Kreider, B., & Pepper, J. (2012). The impact of the National School Lunch Program on child health: a nonparametric bounds analysis. *Journal of Econometrics*, 166, 79–91.

[23] Huang, J., & Barnidge, E., (2016). Low-income children's participation in the National School Lunch Program and household food insufficiency. *Social Science & Medicine*, 150, 8–14.

[24] Nord, M., & Romig, K. (2006). Hunger in the summer: seasonal food insecurity and the National School Lunch and Summer Food Service programs. *Journal of Children and Poverty*, 12(2), 141–158.

[25] Nalty, C., Sharkey, J., & Dean, W. (2013). School-based nutrition programs are associated with reduced child food insecurity over time among Mexican-origin mother-child dyads in Texas Border Colonias. *Journal of Nutrition*, 143, 708–713.

[26] Huang, J., Barnidge, E., & Kim, Y. (2015). Children receiving free or reduced-price school lunch have higher food insufficiency rates in summer. *Journal of Nutrition*, 145(9), 2161–2168.

[27] Nord, M., & Romig, K. (2006). Hunger in the summer: seasonal food insecurity and the National School Lunch and Summer Food Service programs. *Journal of Children and Poverty*, 12(2), 141–158.

[28] Miller, D. P. (2016). Accessibility of summer meals and the food insecurity of low-income households with children. *Public Health Nutrition*, 19(11), 2079–22089.

[29] Mabli, J., & Worthington, J. (2014). Supplemental Nutrition Assistance Program participation and child food security. *Pediatrics*, 133(4), 1–10.

[30] Moffitt, R. A., & Ribar, D. C. (2016). Rasch analyses of very low food security among households and children in the Three City Study. *Southern Economic Journal*, 82(4), 1123–1146.

[31] Murphy, J. M. (2007). Breakfast and learning: an updated review. *Journal of Current Nutrition and Food Science*, 1, 3–36.

[32] Basch, C. E. (2011). Breakfast and the achievement gap among urban minority youth. *Journal of School Health*, 81(10), 635–640.

[33] Kleinman, R. E., Hall, S., Green, H., Korzec-Ramirez, D., Patton, K., Pagano, M. E., & Murphy, J. M. (2002). Diet, breakfast, and academic performance in children. *Annals of Nutrition and Metabolism*, 46(Supplement 1), 24–30.

[34] Murphy, J. M., Pagano, M. E., Nachmani, J., Sperling, P., Kane, S., & Kleinman, R. E. (1998). The relationship of school breakfast to psychosocial and academic functioning: cross-sectional and longitudinal observations in an inner-city school sample. *Archives of Pediatrics and Adolescent Medicine*, 152(9), 899–907.

[35] Nutrition Consortium of NYS. (2005). *Academics & Breakfast Connection Pilot: Final Report on New York's Classroom Breakfast Project*. Albany, NY: Nutrition Consortium of NYS.

[36] Anzman-Frasca, S., Djang, H. C., Halmo, M. M., Dolan, P. R., & Economos, C. D. (2015). Estimating impacts of a breakfast in the classroom program on school outcomes. *JAMA Pediatrics*, 169(1), 71–77.

[37] Gennetian, L. A., Seshadri, R., Hess, N. D., Winn, A. N., & Goerge, R. M. (2016). Supplemental Nutrition Assistance Program (SNAP) benefit cycles and student disciplinary infractions. *Social Service Review*, 90(3), 403–433.

[38] Gennetian, L. A., Seshadri, R., Hess, N. D., Winn, A. N., & Goerge, R. M. (2016). Supplemental Nutrition Assistance Program (SNAP) benefit cycles and student disciplinary infractions. *Social Service Review*, 90(3), 403–433.

[39] Council on Community Pediatrics, American Academy of Pediatrics. (2016). Poverty and child health in the United States. *Pediatrics*, 137(4), e20160339.

[40] American Academy of Pediatrics. (2014). *Adverse Childhood Experiences and the Lifelong Consequences of Trauma*. Available at: https://www.aap.org/en-us/Documents/ttb_aces_consequences.pdf. Accessed on September 20, 2017.

[41] Shonkoff, J. P., & Garner, A. S. (2012). The lifelong effects of early childhood adversity and toxic stress. *Pediatrics*, 129(1), e232–e246.

[42] Shonkoff, J. P., & Garner, A. S. (2012). The lifelong effects of early childhood adversity and toxic stress. *Pediatrics*, 129(1), e232–e246.

[43] American Academy of Pediatrics. (2014). *Adverse Childhood Experiences and the Lifelong Consequences of Trauma*. Available at: https://www.aap.org/en-us/Documents/ttb_aces_consequences.pdf. Accessed on September 20, 2017.

[44] Child Trends. (2013). *Adverse Experiences: Indicators of Child and Youth Well-Being*. Bethesda, MD: Child Trends.

[45] Middlebrooks, J. S., & Audage, N. C. (2008). *The Effects of Childhood Stress on Health Across the Lifespan*. Atlanta, GA: Centers for Disease Control and Prevention, National Center for Injury Prevention and Control.

[46] Center for Youth Wellness. (2014). *A Hidden Crisis: Findings on Adverse Childhood Experiences in California*. San Francisco, CA: Center for Youth Wellness.

[47] Sun, J., Knowles, M., Patel, F., Frank, D., Heeren, T., & Chilton, M. (2016). Childhood adversity and adult reports of food insecurity among households with children. *American Journal of Preventive Medicine*, 50(5), 561–572.