

# Bridging the Gap

## Research Informing Practice and Policy for Healthy Youth Behavior

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**Background:** Bridging the Gap (BTG) is a collaborative research initiative supported by the Robert Wood Johnson Foundation. Ten years ago, BTG was created to assess the impact of policies, programs, and other environmental influences on adolescent alcohol, tobacco, and illicit drug use and related outcomes. This multidisciplinary, multisite initiative examines these factors at multiple levels of social organization, including schools, communities, and states. More recently, the significant increases in obesity among children, adolescents, and adults led BTG to expand its efforts to include research on the role of policies, programs, and other factors on adolescent obesity and the physical inactivity and dietary habits that contribute to this growing problem. Eleven papers resulting from BTG's obesity-related research are contained in this supplement, along with two papers describing the National Cancer Institute-supported efforts to track relevant state policies.

**Methods:** Bridging the Gap involves a variety of data-collection efforts built largely around the Monitoring the Future (MTF) surveys of 8th-, 10th-, and 12th-grade students. These include: surveys of administrators in the MTF schools that gather extensive information on the school food environment, physical education in schools, and other relevant information; collection of contextual information from the communities in which the MTF schools are located; tracking of relevant state policies; and gathering of a wide variety of data from archival and commercial databases. These databases are analyzed individually and in various combinations.

**Discussion:** Bridging the Gap's extensive research has shown the importance of a range of school, community, state, and other influences in affecting adolescent substance use and related outcomes. BTG's early research on adolescent diet, physical activity, and obesity—much of which is contained in this supplement—similarly demonstrates the role of environmental factors in influencing these outcomes and in explaining observed racial/ethnic and socioeconomic-related disparities in them.

**Conclusions:** The growing recognition of the public health and economic consequences of childhood, adolescent, and adult obesity has led to a variety of policies, programs, and other interventions to stimulate healthy eating and physical activity, often despite the lack of evidence on their impact. BTG and others are working to build the evidence base for effective interventions to address this significant problem, but much remains to be learned. (Am J Prev Med 2007;33(4S):S147–S161) © 2007 American Journal of Preventive Medicine

### Introduction

A decade ago, youth tobacco use, drinking, and illicit drug use were on the rise, perceived risk from and disapproval of regular substance use was falling, and perceived availability of various licit and illicit substances was generally rising. These trends raised significant concerns in the public health com-

munity, among policymakers, and in the general public, given the significant health, social, and economic consequences caused by substance use and abuse. A wide variety of policy, programmatic, and other interventions were developed and implemented in efforts to reverse these trends, often with little or no evidence on their potential impact. To address this lack of knowledge and to build the evidence base on the effectiveness of various policies, practices, and programs, the Robert Wood Johnson Foundation (RWJF) created a new initiative, Bridging the Gap: Research Informing Practice and Policy for Healthy Youth Behavior (BTG). In the 10 years since its inception, BTG has considerably improved the understanding of the impact of policies, programs, practices, and other environmental

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influences on youth smoking, drinking, illicit drug use, and their related outcomes.

More recently, as evidence has emerged about the sharp increases in obesity rates among children, adolescents, and adults, a similarly wide variety of interventions with even less evidence on their effectiveness have begun to be adopted and implemented. Concurrently, it became apparent to both the BTG investigators and those working with them at the Foundation that the approaches successfully employed by BTG in its work on youth substance use could be adapted quite well to examining the policies, programs, and other environmental determinants of obesity among adolescents and of the physical inactivity and poor dietary practices that contribute to this growing problem. Of particular importance, many of the relevant outcome measures for this class of behaviors (such as height, weight, exercise habits, and eating habits) had been included for some years in the same study that provided most of the outcome measures on substance abuse—the Monitoring the Future (MTF) study—and relevant contextual measures could be added at little marginal cost to the ongoing surveys of school administrators that were underway as part of BTG.

This supplement to the *American Journal of Preventive Medicine* includes this introduction and a set of eleven papers<sup>1–11</sup> containing some of the first findings from BTG's research on the environmental determinants of adolescent physical activity, healthy eating, and obesity, as well as two papers<sup>12,13</sup> from the National Cancer Institute (NCI)'s related efforts to identify, rate, and track state policies potentially affecting these behaviors. This paper provides an overview of this body of work, beginning with a brief description of BTG and the surveys and other data sets from which it has drawn its data, and it highlights some of the initiative's research on adolescent substance abuse by way of illustrating its potential for parallel contributions to the childhood obesity issue. This is followed by a discussion of the conceptual framework that underlies BTG's more recent work on youth physical activity, healthy eating, and obesity. Finally, the key findings from the papers contained in this supplement are briefly reviewed.

### **Bridging the Gap: An Overview**

Bridging the Gap is a multidisciplinary, multisite collaborative endeavor intended to substantially improve knowledge of the impact of policies, programs, practices, and other environmental influences on adolescent health behaviors. The initiative consists of two integrated components: the Youth, Education, and Society (YES) project based at the University of Michigan's Institute for Social Research (ISR) and the ImpacTeen project based at the University of Illinois' Health Policy Center. From its inception, BTG has focused on alcohol, tobacco, and other drug use, given

the significant public health, social, and economic consequences caused by these behaviors. Due to the addictive nature of these behaviors and the fact that substance use begins largely before adulthood, effective interventions to reduce initiation and uptake during adolescence can have a crucial and lasting impact.

Cigarette smoking is the nation's leading cause of preventable morbidity and mortality, accounting for between 400,000 and 500,000 premature deaths each year.<sup>14–16</sup> Nearly all smoking is initiated during adolescence and, at the time BTG was begun, smoking among adolescents was rising, with prevalence up by about 50 percent during the early/mid-1990s.<sup>17</sup> Alcohol use is estimated to cause over 75,000 premature deaths annually, including many violent deaths among young people in traffic crashes, homicides, suicides, and other accidents.<sup>16,18</sup> As with cigarette smoking, most drinking begins in adolescence; in the mid-1990s, almost three in four high school seniors reported drinking in the past year, while over half reported having been drunk.<sup>17</sup> Illicit drug use accounts for many fewer premature death than does licit drug use—an estimated 17,000 in 2000.<sup>16</sup> The other health, social, and economic consequences are considerable: damaged family and other interpersonal relationships; crime; addiction; HIV/AIDS and other diseases; impairment of social and psychological maturation; and diminished performance in school, work, and other settings. As with youth tobacco use, the use of nearly all illicit drugs rose sharply in the early/mid-1990s.

Bridging the Gap focuses on assessing the impact of laws, regulations, policies, practices, and programs on youth behavior, while accounting for other environmental influences (e.g., marketing) that potentially affect these behaviors. These factors are examined at multiple levels of social organization, including schools, communities, and states. Similarly, multiple perspectives are represented by BTG investigators, including economics, social and developmental psychology, sociology, public health, political science, epidemiology, law, public policy, and community health. Working across these various behaviors, multiple levels, and diverse disciplines has provided opportunities for a unique degree of integrated, interdisciplinary research.

### **Monitoring the Future Data on Student Behaviors**

Much of the initiative's efforts are built around the Monitoring the Future study, directed by Lloyd Johnston and colleagues at the University of Michigan's ISR, and supported by the National Institute on Drug Abuse (NIDA). MTF has been conducting school-based surveys of high school seniors since 1975 and of 8th- and 10th-grade students since 1991. A nationally representative sample of approximately 45,000 to 50,000 adolescents in about 420 schools is surveyed each spring, with

extensive information collected about their substance use, related attitudes and beliefs, perceived availability of various substances, exposure to anti-drug and anti-tobacco advertising, tobacco-related purchase experiences, and much more. Given the extensive information collected in these surveys, multiple, randomly distributed, forms are employed, with all forms including a core set of questions on the key substance use and background/demographic measures; and a set of form-specific questions collecting more detailed information on substance-use-related attitudes, risk perceptions, perceptions of availability, and a variety of other issues. Six forms are used in the 12th-grade survey and four forms are used in the 8th- and 10th-grade surveys. Schools participate in MTF for 2 years, with half of the schools cycling in each year. In addition, the surveys collect a variety of socioeconomic and demographic data from all respondents. Surveys are nationally representative at each grade level for each of the half-samples of schools, with schools selected through a multistage random sampling procedure.<sup>17</sup> Both public and private schools are eligible for selection. The first stage is the selection of primary sampling units defined by geographic location in the coterminous United States. The second stage is the selection of one or more middle and/or high schools within those locations, with probability of selection proportionate to size. The final stage is the selection of students at the targeted grade level within each school. For schools with fewer than 350 students in the targeted grade, all students are sampled; for those with more, a subset is sampled (typically by randomly sampling entire classrooms). Weighting is used to correct for unequal probability of selection at any and all of these stages. More information on MTF may be found at [www.monitoringthe future.org](http://www.monitoringthe future.org).

### **The YES Surveys of School Administrators**

The YES project, which is supported entirely by grants from the RWJF, annually surveys school administrators in the nationally representative half-sample of MTF schools cycling out of the MTF study that year. Beginning with the 1997–1998 school year, and each year since, a survey instrument—the School Policies and Programs Questionnaire—has gathered detailed information on each school’s alcohol, tobacco, and illicit drug-related policies and their implementation, the various prevention and cessation programs and curricula offered by the schools, and other information on the school and its environment (e.g., student composition, staff and other resources, school structure). The survey consists of multiple modules and is designed to be completed by one or more administrators. In addition, a separate observational form is completed by the MTF survey administrators on their last visit to each school; this form assesses various physical characteris-

tics of the school campus and school building(s). Response rates for the YES survey of school administrators, who are paid for their participation, have averaged about 85 percent. More information on the YES study may be found at [www.YESresearch.org](http://www.YESresearch.org).

### **ImpacTeen Data on Community, State, and Commercial Influences**

In order to assess the effects of policies, programs, and practices at the community and state levels on adolescent substance use and related outcomes, a substantial amount of new information had to be developed or gathered from archival sources and then integrated with the MTF data on youth and the YES data on schools. This work was conducted as part of the ImpacTeen component of BTG and included information on state and community policies and other environmental factors, as well as on commercial influences in the larger environment. The University of Illinois at Chicago (UIC) has worked with or currently collaborates with researchers at several other institutions in these activities, including Roswell Park Cancer Institute (tobacco); Andrews University (illicit drugs); RAND (illicit drugs); University of Minnesota (alcohol); MayaTech Corporation (tobacco and illicit drugs); and Battelle (tobacco, alcohol, and illicit drugs). In addition to its core funding from RWJF, additional funding from the NCI, National Institute on Justice, Centers for Disease Control and Prevention (CDC), National Institute on Alcohol Abuse and Alcoholism (NIAAA), NIDA, and others have allowed for extensions of the work done as part of the initiative. For more information on the projects, see their website: [www.impactteen.org](http://www.impactteen.org).

ImpacTeen gathers a range of data on state- and community-level environmental influences through a combination of original data-collection activities and accumulation of data from various archival sources. From 1999 through 2003, this included a significant original data-collection effort in the approximately 210 communities each year in which the MTF 2nd-year half samples of schools were located. Communities were defined by the school “catchment area” (the geographic area from which each school draws its students). The data collected in these communities included four broad components: observational data collection in retail outlets selling tobacco products and/or alcoholic beverages; general community observations; onsite and online collection of local tobacco, alcohol, and/or illicit drug-related ordinances and regulations; and telephone surveys of community key informants. Information on prices, advertising, promotion, and placement of cigarettes, other tobacco products, and various alcoholic beverages were collected from up to 30 retail stores in each community (a census of these outlets in most) through the store observa-

tions. The general community assessments included observable measures such as outdoor advertising (including pro-tobacco and alcohol advertising and anti-tobacco and anti-illicit-drug advertising), social and recreational space, social disorganization, and safety. Local ordinances and regulations were collected from city and county offices and from local health departments. Key informants surveyed included local police chiefs and officers, local health department officials, local coalition leaders, and others identified as actively working to reduce youth substance use and its consequences. These respondents provided information on the implementation and enforcement of state and local policies, their organization's activities addressing youth substance use, after-school and other programs/activities for local youth, and more.

In addition, separate state-level policy databases have been constructed for each substance. The tobacco database includes detailed information on tobacco product taxes; restrictions on smoking in a variety of places; limits on youth access to tobacco products; and policies targeting youth purchase, possession, or use of tobacco products; as well as a variety of state-level measures of tobacco use and its consequences. These data are regularly updated and are available on the ImpacTeen website. The alcohol policy database includes information on alcoholic beverage excise taxes; drinking and driving policies (including zero-tolerance laws targeting underage drinking and driving); various limits on youth access to alcoholic beverages (e.g., server training and keg registration policies); and more. These data have been integrated into the NIAAA's Alcohol Policy Information System (APIS), available online at [www.alcoholpolicy.niaaa.nih.gov](http://www.alcoholpolicy.niaaa.nih.gov). The illicit drug policy database includes information on state policies related to the manufacture, distribution, sale, or possession of various illicit drugs, medical marijuana policies, policies addressing drug treatment, and more. These data are also available on the ImpacTeen website.

In addition, ImpacTeen gathers archival data from multiple publicly available and commercial databases, as well as other surveys containing information on youth and young adult substance use, abuse, and related outcomes. These databases include information on community population characteristics (e.g., age and racial/ethnic composition, household income, and poverty rates); business lists (for construction of outlet density measures); exposure to televised advertising; and prices for alcohol, tobacco, and other products. Finally, as coordinating center for BTG, ImpacTeen engages in a range of communications activities to disseminate the findings from BTG research to diverse audiences, including policymakers, public health and school officials, advocacy organizations, and other researchers.

## **Bridging the Gap's Research Findings on Alcohol, Tobacco, and Illicit Drug Use**

These databases, individually and in various combinations, have been used in numerous analyses that have improved the understanding of the extent of, and changes in, policies, programs, practices, and other environmental influences and their associations with adolescent substance use and abuse. Over 100 peer-reviewed articles, book chapters, chart books, and other publications have resulted from BTG's research to date. These are listed, and in a number of cases directly available, on the websites for ImpacTeen and YES. The brief synopsis below of some of BTG's research on substance use illustrates the range of issues that also can be addressed in the domain of childhood obesity.

In the tobacco area, BTG research using retail store observation data showed that cigarette companies increased their marketing efforts at the point-of-sale after the elimination of billboard advertising under the Master Settlement Agreement,<sup>19</sup> documented how the extent of these marketing efforts varied by type of outlet<sup>20</sup> and changed over time,<sup>21</sup> and showed that these marketing efforts were associated with greater smoking prevalence and increased smoking uptake among adolescents.<sup>22</sup> Others have used the MTF survey to describe methods and ease of access to tobacco products for youth,<sup>23</sup> adolescent recall and appraisal of anti-smoking advertising,<sup>24</sup> and the role of smoking history and intentions in predicting future smoking.<sup>25</sup> Still others have employed state, local, and/or school tobacco-related policy and other data to examine the role of cigarette prices in youth smoking initiation<sup>26</sup>; the effects of home, school, community and/or state restrictions on smoking on youth smoking prevalence<sup>27,28</sup>; the impact of funding for comprehensive state tobacco control programs on overall smoking and youth smoking<sup>29,30</sup>; and the influence of televised anti-smoking advertising on youth smoking behavior, attitudes, and beliefs.<sup>31,32</sup>

Similar analyses have been completed for alcohol and/or illicit drug use. Variations in alcohol marketing at the point-of-sale have been described<sup>33</sup> and related to various community characteristics.<sup>34</sup> Comprehensive chart books summarizing state alcohol and illicit drug-related policies have been produced,<sup>35,36</sup> key state policies and their evolution documented,<sup>37-39</sup> and the local implementation of state and federal drug control policies described.<sup>40</sup> Analyses also have raised questions about whether school drug testing has a significant impact on student drug use<sup>41,42</sup> and showed that marijuana prices and related attitudes are significantly associated with youth marijuana use.<sup>43</sup> Others have shown that states' zero-tolerance laws targeting underage drinking and driving reduce youth drinking and driving while having no impact on youth drinking<sup>44</sup> and that higher alcoholic beverage prices reduce the

likelihood of moving from abstinence to moderate and from moderate to heavy drinking among young adults.<sup>45</sup> Evidence also has been reviewed on the effects of price on alcohol use and related problems.<sup>46</sup> Still others have looked across substances at, for example, the relationships between community- and nonclassroom-based substance-use prevention strategies and adolescent alcohol, tobacco, and illicit drug use,<sup>47</sup> and at the relationships between young adults' use of marijuana and alcohol<sup>48</sup> and youth marijuana use and cigarette smoking.<sup>49</sup>

These are a few examples from BTG's extensive research on the effects of policies, programs, practices, and other environmental influences on adolescent substance use, abuse, and related outcomes. In the 10 years since BTG began, states, communities, and schools have adopted new and/or strengthened existing tobacco, alcohol, and illicit drug control policies; improved the implementation and enforcement of these policies; implemented a variety of school- and community-based programs; and taken other steps to reduce adolescent substance use. While numerous factors have prompted this action, it is likely that the growing evidence base on the importance of these and other environmental influences on youth behavior has helped to enhance the effectiveness of these interventions. The significant declines in adolescent substance use that began in the late 1990s—in particular cigarette use—may be, in part, the result of this work.

### **Bridging the Gap Turns to Adolescent Obesity**

While BTG's research on adolescent substance use continues, the initiative's more recent efforts increasingly have focused on the role environmental factors play in determining adolescent physical activity, diet, and obesity-related outcomes. This additional emphasis has resulted from the emerging evidence of a rapid rise in obesity, particularly among children and adolescents; the scramble by national, state, and school policymakers and public health professionals to adopt policies and implement programs that address these problems; and a serious absence of evidence on the impact of most of these interventions. These factors parallel many of the characteristics of the substance abuse epidemic of recent decades; in addition, both substance abuse and obesity involve sets of adolescent behaviors that are preventable, meaning that all of the many adverse consequences associated with each are likewise preventable.

In the 2003–2004 National Health and Nutrition Examination Survey, 17.4% of adolescents aged 12 to 19 were overweight, based upon the CDC's definition of overweight as having a body mass index (BMI) greater than or equal to the 95th percentile for age and gender based on earlier surveys, up nearly 18% from 1999–2000 and more than triple the rate from the late

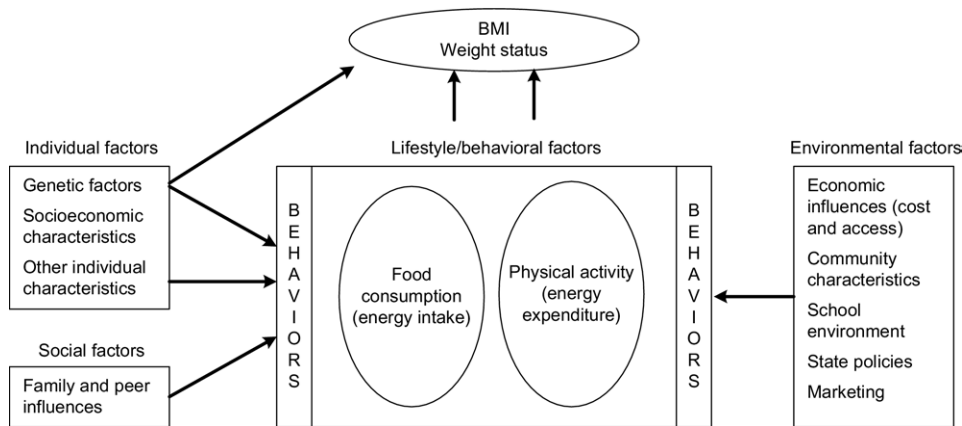
1970s.<sup>50,51</sup> This trend echoes the rise in overweight among younger children as well as obesity among adults.<sup>50,51</sup> Significant socioeconomic and racial/ethnic differences in the prevalence of overweight among youth have been reported, with the highest rates among non-Hispanic African-American youth and among youth from lower socioeconomic groups.<sup>51,52</sup> Significant physical and emotional health problems have been linked to childhood overweight, including type 2 diabetes, hypertension, sleep apnea, cholelithiasis, low self-esteem, negative body image, and depressive symptoms.<sup>52</sup> Moreover, there is a strong link between being overweight during childhood and adolescence and being obese in adulthood.<sup>52,53</sup> While there is some uncertainty over the numbers, it is clear that obesity causes many thousands of premature death,<sup>16,54</sup> as well as imposes significant economic costs.<sup>55</sup>

The recognition of this growing epidemic has prompted actions by policymakers, the public health community, and other organizations. Many of these actions have focused on environmental changes targeting the physical inactivity and poor diets that are the leading causes of overweight and obesity. In many cases, however, the evidence base to demonstrate the effectiveness of these interventions in promoting physical activity and healthy eating, and in reducing overweight and obesity, is almost non-existent.

To address this gap and to inform the development of more effective interventions, BTG has begun to apply the research strategies that it used to address adolescent substance use to examine the impact of policies, programs, practices, and other contextual influences on adolescent physical activity, diet, and weight. BTG is in a unique position to do this, given its distinctive combination of data sources and analytic efforts. [Figure 1](#) contains the general conceptual framework that underlies BTG's research on adolescent obesity. This framework draws on the multiple disciplines represented by BTG and highlights the importance of contextual factors and the interaction of these factors with individual and social factors in affecting healthy eating and physical activity and, ultimately, BMI and weight status.

### **Monitoring the Future Surveys and Adolescent Obesity**

The MTF surveys continue to be a primary source of information on the relevant youth outcomes, other relevant behaviors, and socioeconomic and demographic factors. Since 1986, the MTF survey of high school seniors has included questions on student height and weight, allowing the construction of BMI and other indicators reflecting overweight and at-risk-for-overweight youth. Comparable questions specific to



**Figure 1.** Conceptual model. BMI, body mass index.

particular questionnaire forms were included when MTF added its 8th- and 10th-grade surveys in 1991. In addition to the height and weight questions, various forms include questions on dietary habits (frequency of consumption of green vegetables or fresh fruits, frequency of eating breakfast); physical activity (frequency of vigorous exercise; frequency of participation in sports, athletics, or exercising; participation on a school athletic team); sedentary behavior (frequency of television watching, separately for weekdays and weekends; frequency of nonschool/work computer use); and sleep (frequency of getting 7 or more hours of sleep each night; frequency of getting less sleep than respondents think they should).

Most of these questions were added to the surveys at the same time as the height and weight variables as part of an effort by the MTF investigators to assess healthy lifestyle as a correlate and possible determinant of substance use. A few were added earlier.

Consistent with the trends observed in other data, Johnston and O'Malley's examination<sup>56</sup> of the MTF data showed that BMI has risen at all grade levels for both boys and girls, with the exception of a possible leveling-off among 8th-grade girls in the mid-1990s. Similarly, the prevalence of at-risk-for-overweight or overweight has risen steadily for both boys and girls, again with the exception of 8th-grade girls for whom there has been little change over time since the surveys began in 1991. Particularly notable are the increases in the prevalence of overweight among 12th graders, where prevalence rose from 3.3% and 1.9% in 1986 among boys and girls, respectively, to 11.2% and 7.0% in 2002—more than a tripling over that period. Trends in the various behaviors asked about in the MTF surveys suggest that the increases in BMI and unhealthy weight may well result from concurrent reductions observed in physical activity, healthy eating, and sleep, along with increased screen time. For example, there has been a clear downward trend in the percentage of 10th- and

12th-grade youth reporting frequent vigorous exercise, as well as of those reporting frequent participation in sports, athletics, or exercise. Similarly, the prevalence of youth who eat breakfast, green vegetables, and/or fruit nearly every day has generally declined in all three grades for both boys and girls. Perhaps most striking are the sharp declines over time in the percentage of youth reporting 7 or more hours of sleep nearly every day and the increases in those reporting that they get less sleep than they should.

### Youth, Education, and Society Survey

As BTG's efforts have increasingly focused on adolescent obesity, the annual YES surveys of middle and high school administrators have been modified to encompass relevant measures. For example, extensive physical education and other physical activity-related items were introduced in 2003; extensive items on the school food and beverage environment and on commercial contracts in schools were added in 2004; and extensive questions on school wellness policies, programs, and practices were added in 2006. These added to questions on the availability of after-school activities that have been a part of the survey since it was first conducted in 1998. As noted above, a wide range of information is collected through the survey, including basic information about the school and student population; parent involvement in the school; school policies targeting alcohol, tobacco and/or illicit drugs; the prevention curricula used by the school; other school programs targeting substance use; the school food environment; and school physical education policies and practices. To facilitate completion and to ensure reliability, the survey consists of several color-coded modules that can be completed by different school personnel; instructions indicate, for example, that the school's Food Service Manager is likely to be best suited to answering the module on the school's food and beverage offer-

ings, and that section is, in fact, usually completed by the person in that role.

With respect to physical education and physical activity, the YES survey collects information on students in the grade surveyed in MTF—that is, those in grades 8, 10, or 12—on:

- Physical education requirements
- Frequency and duration of physical education classes
- Percentage of students participating in physical education classes
- Percentage of students participating in interscholastic or varsity sports (separately for boys and girls)
- Percentage of students participating in intramural sports or physical activity clubs (separately for boys and girls)
- Percentage of students walking or biking to school
- Physical fitness testing and whether the results are provided to parents
- Other significant school-based efforts in the district or the school to promote student physical activity or more-healthy eating (open-ended)

The YES survey includes a module focused on school food and nutrition policies and practices that gathers a variety of information, including:

- Whether or not the school offers breakfast and/or lunch to students
- Participation in the U.S. Department of Agriculture (USDA)'s National School Lunch Program and, if participating, the average full price of the meal
- School menu planning systems
- Level at which school food service decisions are made
- Participation in the USDA's Team Nutrition program
- Availability of brand name fast-food items, either à la carte or as part of the school lunch meal
- Availability of a variety of food products (e.g., candy, lowfat and other salty snacks, lowfat and other baked goods, fruits, vegetables, salads, bread products, lowfat or regular ice cream, and sandwiches)
- Availability of various beverages (e.g., diet soft drinks, regular soft drinks, bottled water, milk [lowfat, skim, and/or whole; 2% or flavored], and 100% fruit or vegetable juice)
- Times during the school day when these foods/beverages are available (before classes, during non-lunch school hours, during lunch, and/or after school)
- Locations from which these foods/beverages are available (vending machines, school/student stores, snack bars/carts, à la carte at school cafeteria)
- Composition of the school lunch meals
- Availability of a salad bar in the school cafeteria

- Provision of menu and nutrition information to students and/or parents
- Use of differential pricing strategies to encourage healthier eating and drinking behaviors

In an effort to capture information on school-level implementation of the school district "wellness policies" mandated by the 2004 National School Lunch Act, the YES survey also includes a set of questions about these policies and other school-based health-related activities, including:

- Whether or not the district has a school wellness policy addressing student nutrition and/or physical activity
- Whether or not the school has developed (or is developing) explicit goals to improve student wellness through nutrition education, physical activity, and/or other activities
- School or district nutrition guidelines for all foods available to students during school hours
- School or district plans for monitoring the implementation of wellness policies
- Involvement of key stakeholders (e.g., parents, students, teachers, and others) in developing the wellness policy
- Formal classroom instruction on nutrition and dietary behavior and/or physical activity, exercise, and health-related fitness and the percentage of students exposed to this instruction
- Other significant school-based activities intended to promote healthier eating and drinking practices among students (asked in an open-ended answer format)

Finally, the YES survey collects other relevant information, including whether student BMI is measured and whether it is reported to the parent; presence of and revenues generated from contracts between schools and soft-drink companies; and school start time. As described briefly below, many of the measures contained in the YES survey are the focus of several of the papers contained in this supplement.

### **ImpacTeen Data Collections**

The ImpacTeen community data collections were conducted annually from 1999 through 2003 in the communities around the 2nd-year half-sample of schools cycling out of the MTF surveys. "Communities" were defined by the geographic area from which the MTF schools drew the vast majority of their students; in less-urban settings, this could include several towns and small cities, while in highly populated urban settings, it could be a relatively small section of a large city. As part of the general community observations, information was collected on a variety of items potentially related to physical activity, including the availability of social and

recreational spaces (e.g., sports areas, parks, public pools, and beaches); the availability of walking/biking paths; availability of bike lanes on roads; the availability of street lights/safe lighting; presence of curbs and sidewalks in residential neighborhoods; and traffic density. ImpacTeen researchers have used these data to look at the relationships between various community characteristics and the availability of opportunities for physical activity in communities.<sup>57</sup> As might be expected given the racial/ethnic and socioeconomic differences in obesity rates, significant differences were observed across communities. Those with higher minority populations, lower median household incomes, and higher poverty rates generally had fewer of these physical activity opportunities available. The lack of these opportunities is likely to be an important factor in explaining the lower rates of physical activity and higher rates of obesity in these populations.

Similarly, the ImpacTeen community key informant surveys collected a variety of information from respondents on the availability of various opportunities for adolescent physical activity, including school- and nonschool-based after-school sports activities; other after-school activities (e.g., dance and theater, Boy and Girl Scouts); supervised activity centers (e.g., YMCA and YWCA, community centers); indoor sports facilities; and other settings for physical activity (e.g., ice/roller rinks, skateboard parks, playgrounds). Analyses linking the availability of these opportunities and those collected in the community observations of the MTF survey on adolescent physical activity and weight-related outcomes are ongoing. In addition to the questions asked of all respondents, local health department respondents (in 2003) were asked about their efforts to promote physical activity and/or healthy eating among adolescents and adults, as well as the importance they placed on these efforts in comparison to their other activities. The health department survey data are the focus of one of the papers contained in this supplement.

In addition, the ImpacTeen project is developing information on state-level policies that potentially affect youth physical activity, healthy eating, and obesity, building on experiences developing comparable databases on tobacco, alcohol, and illicit drug-related policies. This endeavor complements the ongoing efforts of the NCI to track state policies targeting the school food environment and student physical activity which are described briefly below and in more detail in two of the papers<sup>12,13</sup> contained in this supplement. Among the policies not currently included in the NCI's database and likely to be included in the ImpacTeen obesity-related state-level policy database are snack and soda taxes; dedicated funding for school-based nutrition education, physical education, or other obesity prevention programs/activities; regulations targeting school pouring contracts and other contracts affecting

the school food environment; mandatory school screening for obesity-related health conditions (e.g., type 2 diabetes); safe routes to school policies; policies supporting sustainable practices (e.g., farm-to-school requirements); state-mandated wellness policies; policies requiring the provision of nutrition information for foods and beverages available at school; and policies restricting the use of snacks as rewards in schools. Pilot testing of methods for collecting these policies from state statutes and regulations are currently in progress.

## Archival Databases

The ImpacTeen component of BTG continues to gather information on numerous factors that may affect youth health-related behaviors, including physical activity, diet, and obesity. These data are drawn from a variety of publicly accessible and commercial databases and are being used in a range of analyses, both individually and in combination with other databases collected originally or obtained by BTG. Archival data of the following types have been used in several of the papers contained in this supplement and/or in other BTG papers on adolescent obesity:

- Outlet density measures constructed from the business lists obtained from the Dun and Bradstreet (D&B) MarketPlace database. This database contains a variety of information on over 14 million U.S. businesses and is updated regularly by D&B. Business lists can be developed based on multiple criteria, including type of business, location, size, employment, and sales. For use in BTG, business lists have been developed for different types of businesses based on primary Standard Industry Classification (SIC) codes identifying food or physical activity-related businesses. Food-related businesses include: fast-food restaurants; full-service restaurants; large chain supermarkets; independent supermarkets; grocery stores; and convenience stores. Physical activity-related businesses include physical fitness facilities; membership sports and recreation clubs; and dance studios, schools, and halls. The business lists are developed at the ZIP-code level and matched to other ZIP-code level information, as well as to the MTF survey data based on the ZIP code in which each school is located.
- Prices for assorted healthy and unhealthy foods are taken from the ACCRA quarterly cost-of-living reports. Each quarter, ACCRA, The Council for Community and Economic Research (formerly the American Chamber of Commerce Researchers' Association), collects prices on a variety of goods and services from more than 300 cities. Prices are obtained from a sample of stores, with most items reflecting prices for brand-named products. The



goods and services chosen, and the stores from which prices are collected, are intended to reflect a middle management standard of living. ACCRA uses these prices and weights based on expenditure patterns, to compute a local cost-of-living index. The sample of products includes lettuce, tomatoes, bananas, potatoes, peaches, sweet peas, frozen corn, fast-food hamburgers (McDonald's Quarter Pounder with Cheese); cheese pizza (Pizza Hut or Pizza Inn); and a fried chicken meal (from KFC or Church's). In various BTG analyses, these price data are used to compute a fruit and vegetable price index (with each weighted based on expenditure shares obtained from the Bureau of Labor Statistics' Consumer Expenditure Survey) and a fast-food price index (with each item equally weighted). The individual product prices and the two price indices are matched to the school student survey data based on the proximity of the ACCRA city to the MTF school, along with a set of indicators reflecting the quality of the price match.

- Televised advertising for various food products, as well as public service advertising (PSA) promoting physical activity and healthy eating, acquired from Nielsen Media Research (NMR). NMR tracks television viewing in a nationally representative sample of households and reports overall ratings for television programming (including advertising), as well as ratings for a number of targeted subgroups based on age, gender, race/ethnicity, and other characteristics. To date, BTG has obtained two sets of data from NMR reflecting exposure to TV advertising among children, adolescents, and adults. The first data set, acquired as part of the Youth Smoking and the Media project, examined the impact of exposure to anti-smoking advertising. It included all PSAs from 1999 through 2003, with media-market-level exposure measures for the 75 largest U.S. media markets. These ads included both state-sponsored ads and national ad campaigns, such as the CDC's VERB campaign<sup>58</sup> promoting physical activity. The second data set included exposure to all advertising for the most watched network, cable, and syndicated series and network and cable specials for six population subgroups: 2 through 11 years, 12 through 17 years, and 18 years and older for white and African Americans in each age group.
- Community population characteristics drawn from U.S. Census Bureau databases. These data include information on the age, gender, and/or racial/ethnic composition of communities, median household income, poverty rates, home ownership rates, and other measures of community demographic makeup and socioeconomic status (SES). Measures are constructed at alternative levels of aggregation, including at the ZIP-code and county level.

Table 1 summarizes the key databases BTG researchers employ in their analyses of the impact of school, community, state, and other environmental influences on adolescent physical activity, diet, and obesity.

These data are used alone and in various combinations with other BTG data in several of the papers contained in this supplement. In addition, BTG researchers are working with these data in other analyses. For example, ZIP-code-level outlet density measures constructed from the D&B business list data have been merged with ZIP-code-level data on community population characteristics to examine the associations among community socioeconomic and demographic factors and availability of food and physical activity-related outlets. One recent paper by Powell and her colleagues<sup>59</sup> showed that commercial physical activity-related outlets are less available in lower-income communities as well as in communities with higher racial/ethnic minority populations, confirming BTG's findings with respect to free opportunities for physical activity described above.<sup>57</sup> Similar associations are observed with respect to food stores, with chain supermarkets less available in low-income, high-minority communities, while nonchain supermarkets and grocery stores are relatively more available.<sup>60</sup> Other BTG analyses combine the outlet density measures, food prices, and community characteristics data with the MTF data on adolescent behavior and weight outcomes. For example, Powell and her colleagues<sup>61</sup> found that fast-food prices significantly affected adolescents' fruit and vegetable consumption and BMI, as well as their likelihood of being overweight, while fruit and vegetable prices and the density of fast-food and other restaurants had weaker associations with these outcomes. Likewise, BTG researchers are assessing youth and adult exposure to televised food advertising and differences in exposure across different age and racial/ethnic groups. One of these analyses, for example, found that over one quarter of national advertising exposure for children, aged 2 through 11 years, in the 2003–2004 television season was for food-related products, with greater exposure among African-American children.<sup>62</sup>

### **BTG and Other Papers in this Supplement**

The papers contained in this supplement<sup>1–13</sup> highlight the breadth of BTG's research on the policy and environmental factors that are potentially important determinants of obesity-related behaviors and outcomes among adolescents, along with related efforts to identify and track relevant state policies. Given the significant disparities in the prevalence of physical inactivity, unhealthy eating, and obesity-related outcomes among youth in different racial/ethnic and/or socioeconomic groups, many of these papers seek to

**Table 1.** Key databases employed in Bridging the Gap obesity research

Database	Brief description	For more information
Monitoring the Future	<ul style="list-style-type: none"> <li>- Annual school-based surveys of 8th-, 10th-, and 12th-grade students in the coterminus U.S.</li> <li>- 12th grade since 1975; 8th/10th grade since 1991</li> <li>- Approximately 45–50,000 youth in 420 schools each year</li> <li>- Alcohol, tobacco, and illicit drug use and related knowledge, attitudes, and beliefs</li> <li>- Height, weight, physical activity, diet, and related behaviors</li> <li>- Supported by the National Institute on Drug Abuse</li> </ul>	<a href="http://www.monitoringthefuture.org">www.monitoringthefuture.org</a>
Youth, Education, and Society	<ul style="list-style-type: none"> <li>- Annual surveys of middle and high school administrators in MTF schools (second-year half-sample) since 1998</li> <li>- School food environment, physical education requirements, student physical activity, beverage contracts</li> <li>- School ATOD-related policies, programs, and prevention curricula</li> <li>- Supported by the Robert Wood Johnson Foundation</li> </ul>	<a href="http://www.yesresearch.org">www.yesresearch.org</a>
ImpacTeen community observations	<ul style="list-style-type: none"> <li>- Annual community observations in catchment areas for MTF second-year half-sample schools from 1999 through 2003</li> <li>- In-store observations of tobacco and alcohol prices, placement, advertising, and promotion</li> <li>- Outdoor advertising and counter-advertising</li> <li>- Collection of local ATOD and youth-related ordinances</li> <li>- Indicators of community social capital, availability of opportunities for youth physical activity</li> <li>- Supported by the Robert Wood Johnson Foundation</li> </ul>	<a href="http://www.impacteen.org">www.impacteen.org</a>
ImpacTeen Key informant interviews	<ul style="list-style-type: none"> <li>- Annual interviews with local health department officials, police chiefs and police officers, local coalitions, and others actively working to address youth substance use</li> <li>- Conducted in communities in which MTF second-year half-sample schools were located, 1999 through 2003</li> <li>- After-school opportunities for local youth, enforcement of state and local policies, support for efforts targeting youth substance use and, in last year, adolescent obesity</li> <li>- Supported by the Robert Wood Johnson Foundation</li> </ul>	<a href="http://www.impacteen.org">www.impacteen.org</a>
ImpacTeen state policy databases	<ul style="list-style-type: none"> <li>- Major state tobacco control policies, illicit drug-related policies, policies addressing alcohol and drug treatment (various years)</li> <li>- New efforts to track state policies with potential to impact on physical activity, diet, and obesity-related outcomes</li> <li>- Supported by the Robert Wood Johnson Foundation</li> </ul>	<a href="http://www.impacteen.org">www.impacteen.org</a>
Alcohol policy information system	<ul style="list-style-type: none"> <li>- Major state alcohol-related policies, various years</li> <li>- Supported by the National Institute on Alcohol Abuse and Alcoholism</li> </ul>	<a href="http://www.alcoholpolicy.niaaa.nih.gov">www.alcoholpolicy.niaaa.nih.gov</a>
State obesity policy rating system	<ul style="list-style-type: none"> <li>- Policies targeting physical education/physical activity in schools</li> <li>- Policies addressing the school food environment</li> <li>- Supported by the National Cancer Institute</li> </ul>	Two papers by Mâsse and colleagues contained in this supplement; data will eventually be posted on NCI's web site <a href="http://www.nielsenmedia.com">www.nielsenmedia.com</a>
Television advertising	<ul style="list-style-type: none"> <li>- Exposure to televised food and beverage advertising <ul style="list-style-type: none"> <li>○ Nationally, by age and race</li> </ul> </li> <li>- Exposure to televised public service advertisements promoting physical activity or healthy eating <ul style="list-style-type: none"> <li>○ By market over time, by age</li> </ul> </li> <li>- Proprietary data produced by Nielsen Media Research</li> </ul>	<a href="http://www.coli.org">www.coli.org</a>
Food and beverage prices	<ul style="list-style-type: none"> <li>- Quarterly prices for variety of foods and beverages, including fast foods, fruits and vegetables, and more</li> <li>- Local cost-of-living index</li> <li>- Quarterly for more than 300 U.S. cities</li> <li>- Produced by ACCRA (formerly the American Chamber of Commerce Researchers' Association)</li> </ul>	<a href="http://www.coli.org">www.coli.org</a>

*(continued on next page)*

**Table 1.** (continued)

Database	Brief description	For more information
Outlet density	<ul style="list-style-type: none"> <li>- Business lists for over 14 million U.S. businesses</li> <li>- Based on standard industrial classification (SIC) codes</li> <li>- Uses both primary and non-primary SIC codes, as reported by businesses, to the eight-digit level</li> <li>- Obtained from Dun &amp; Bradstreet's MarketPlace database</li> </ul>	<a href="http://www.dnb.com">www.dnb.com</a>
Community population characteristics	<ul style="list-style-type: none"> <li>- Age, gender, and racial/ethnic composition of communities</li> <li>- Median household income, poverty rates, home ownership rates</li> <li>- Other community socioeconomic and demographic measures</li> <li>- At multiple levels of aggregation (including school catchment area and zip code)</li> <li>- Obtained from the U.S. Census Bureau</li> </ul>	<a href="http://www.census.gov">www.census.gov</a>

document and explore disparities in these outcomes and in their potential determinants. This section briefly reviews these papers and highlights some key findings.

### Adolescent Behavior and Obesity

Delva and his colleagues<sup>1</sup> use data from the 1998–2003 MTF surveys of 8th and 10th graders to describe differences in the prevalence of overweight and other lifestyle variables by gender, race/ethnicity, and SES. They find that prevalence of overweight is greatest among males, racial/ethnic minorities, and lower-SES youth, along with those in rural, Southern communities. At particular risk are Hispanic boys and African-American girls, reflecting an important gender by race/ethnicity interaction. In a recent article from BTG, by the same authors, it was found that the prevalence of overweight is rising in nearly all subgroups.<sup>63</sup> The authors go on to examine the importance of various possible contributory behaviors—including frequency of eating breakfast, fruits, and vegetables; regular exercise; TV watching; and getting 7 hours of sleep—on prevalence of overweight in these subgroups. As expected, their multivariate analyses showed that these behaviors correlated significantly and in the expected direction with the prevalence of overweight, with the effects of SES on prevalence attenuated by the inclusion of these behaviors. Most of the healthier of these behaviors have been shown to be in decline, with getting exercise declining faster among males than among females.<sup>56,63</sup> Interestingly, Delva and his colleagues found that these behaviors are more important than the family and parenting variables they examined in explaining the prevalence of overweight among adolescents in the various subgroups.

### School Influences on Adolescent Obesity

O'Malley and his colleagues<sup>2</sup> begin the analyses of the importance of school and community influences on

adolescent obesity by assessing the extent to which there exist differences among schools in the average BMI and the prevalence of overweight of their students. Using the MTF on 8th-, 10th-, and 12th-grade student data from 1991–2004, they find that between-school differences represent relatively small shares of the observed variances in BMI and the proportion of students that are overweight. Nevertheless, significant differences exist among schools; for example, just over 10% of students are overweight, on average, in the lowest decile of schools based on this measure, while 43.6% are overweight, on average, in the highest decile. Racial/ethnic composition and SES of the student population are relatively important determinants of BMI and overweight, even after controlling for individual race/ethnicity and SES. Other school characteristics, including school type (public, Catholic-private, non-Catholic private); school size; and selected community characteristics (region and population density) explain a relatively smaller share of the observed differences among schools.

Johnston and his colleagues<sup>3</sup> look more closely at physical education and sports participation among students using data from the 2003–2005 MTF and YES surveys. They find that there is a significant drop in both physical education (PE) requirements between 8th and 12th grades, with schools more than four times more likely to require 8th graders to take PE than 12th graders. Consequently, student participation in PE classes falls sharply from 8th grade to 12th grade. In contrast, student participation in varsity sports differs little across grades, while participation in intramural sports is much lower than in varsity sports and falls somewhat between middle school and high school. There are minor differences in PE requirements and participation across student subgroups based on gender, race/ethnicity, and SES. There are, however, more significant subgroup differences in both varsity sports and intramural sports participation; with girls, racial/

ethnic minority youth, and low-SES students less likely to participate in them.

Two papers<sup>4,5</sup> describe various aspects of the school food and beverage environment and differences in these factors across schools, based on data from the 2004 and 2005 YES and MTF surveys. In the first of these, Johnston and his colleagues<sup>4</sup> find that the vast majority of high school students and most middle school students attend schools that have contractual agreements with soft drink bottlers. As a result, the vast majority of students have access to soft drinks either through vending machines or in the school cafeteria, with middle school students having somewhat less access than high school students and having diet beverages less available than regular soft drinks. Soft drink availability is greatest for Hispanic students, while advertising and promotion of soft drinks is more prevalent in schools with lower-SES students. The revenues received by schools from these contracts are more than nine times higher per student in high schools than in middle schools, with overall revenues highest in schools with a greater proportion of Hispanic students.

In the second of these papers, Delva and his colleagues<sup>5</sup> assess the availability to students of healthy and less-healthy foods in schools. They find that nearly all U.S. middle and high schools offer lunches to students, while more than four fifths offer breakfast (with low-SES and/or high-minority schools more likely to offer breakfast). About three quarters of middle school students and nearly two thirds of high school students regularly eat the school lunch, making the school an important source of food and beverages consumed by adolescents. A wider variety of both healthy and unhealthy food options is available to high school students than to middle school students. There are modest racial/ethnic differences in the availability of healthy and less-healthy products. For example, Hispanic students are more likely to have access to brand-name fast foods at lunch and to ice cream through vending machines, while African-American students are less likely to have access to the healthier lowfat salty snacks, fruits, and vegetables through vending machines. Both healthier and less-healthy snacks are more likely to be available to high-SES students than to low-SES students, but the ratio of unhealthy to healthy snacks is greater among low-SES students.

### **Community Influences on Adolescent Obesity**

Four papers<sup>6,7,10,11</sup> highlight different aspects of the community environment in affecting adolescent behaviors and obesity. The first of these adds to BTG's earlier research assessing differences in the availability of physical activity opportunities and food-related outlets across communities. Using ZIP-code-level data from the 28,050 ZIP codes in which the vast majority of the U.S. population resided in 2000, Powell and

her colleagues<sup>6</sup> describe the associations between community demographic and socioeconomic characteristics and the availability of fast-food and full-service restaurants. Fewer restaurants of all types are found in high-minority and/or low-income communities. However, the proportion of all restaurants accounted for by fast-food restaurants is higher in these communities, suggesting that the choices available in low-income, high-minority communities are relatively less healthy (a finding consistent with that observed for the ratio of healthy to unhealthy snacks available to low-SES students in schools, as described above).

The second paper<sup>7</sup> uses data from the 2003 ImpacTeen community key informant surveys of local health departments with jurisdiction over the communities in which the 2nd-year half-samples of MTF 8th-, 10th-, and 12th-grade schools were located. Given BTG's increasing focus on obesity, that year's health department survey included a module on the relative importance of, and on each department's activities aimed at, increasing physical activity/healthy eating and preventing obesity among adolescents. While respondents generally indicated that efforts to promote healthy eating and physical activity and to control obesity were relatively important compared to other efforts, relatively few provided or supported activities/programs targeting these outcomes.

The remaining two papers<sup>10,11</sup> link outlet density measures from the D&B business list data and community characteristics from census data to the MTF surveys to assess the relationships among availability of various types of businesses, community income, and adolescent behavior and/or weight-related outcomes. The first<sup>10</sup> of these uses the 1997–2003 8th-, 10th-, and 12th-grade student data to examine the associations among the availability of commercial physical fitness facilities and student physical activity. Increased availability of these facilities is found to have a statistically significant, albeit small, impact on the likelihood that youth report frequent sports participation and/or frequent vigorous exercise. The magnitude of these associations falls substantially when controlling for community income (given the greater availability of these outlets in higher income communities), which itself has a positive association with physical activity.

The second<sup>11</sup> of the papers using the merged business list, census, and MTF data looks at the relationships between access to food stores (chain and non-chain supermarkets, convenience stores, and other grocery stores) and adolescent BMI among 8th- and 10th-grade students from 1997 through 2003. Greater availability of chain supermarkets is negatively and significantly associated with BMI, while greater availability of convenience stores has a positive and significant impact. Interestingly, the impact of availability on the likelihood of overweight is substantially larger than on BMI, suggesting that youth on the margin between

healthy and unhealthy weight are most affected. Similarly, relatively larger associations are observed for African-American adolescents and for those in households in which the mother works full time.

### Media Influences on Adolescent Obesity

Two of the papers in this supplement use NMR data to describe youth exposure to televised advertising. In the first of these,<sup>8</sup> Powell and her colleagues assess exposure to food-related advertising on the most watched network, cable, and syndicated programs among youth aged 12–17 years during the 2003–2004 TV season. Nearly a quarter million 30-second equivalent advertising spots shown on 170 top-rated shows during this 9-month period are examined. About one fifth of these spots (nearly 50,000 ads) are food-related, accounting for almost one quarter of product advertising (advertising after excluding TV program promotions and PSAs). In contrast, all PSAs account for less than 2% of the ads seen by adolescents. Food products account for a proportionately larger share of the product ads seen by African-American adolescents. Given this and given racial/ethnic differences in TV watching, African-American youth are exposed to about 1.6 times as many food ads than their white counterparts. Of the overall food product advertising seen by adolescents, the food products most heavily advertised to them include fast food, sweets, and beverages, accounting for 23%, 22%, and 17%, respectively.

The second paper<sup>9</sup> focuses on obesity-related PSAs, comparing and contrasting adolescent exposure to these messages with exposure to anti-smoking ads sponsored by public health agencies and organizations (e.g., state tobacco control programs and the American Legacy Foundation). The success of the anti-smoking ads in reducing youth smoking<sup>31</sup> suggests that similar efforts to promote physical activity and healthy eating may be effective in preventing childhood and adolescent obesity. Emery and her colleagues<sup>9</sup> show that while exposure to obesity-related PSAs increased from 1999 to 2003, exposure to these ads was well below exposure to the anti-smoking ads. Most of the exposure is accounted for by the CDC's national VERB campaign<sup>58</sup> targeting youth and promoting physical activity, launched in 2002. State-sponsored ads were relatively rare, beginning in California in 2000 and spreading to seven other states by 2003; most of these ads focused on healthy eating and targeted a general audience.

### State Policies Targeting Obesity

The NCI's ongoing efforts to identify, rate, and track state-level policies targeting obesity are described in two papers by Mâsse and her colleagues.<sup>12,13</sup> To date, these efforts have focused on policies targeting student physical education (PE) and the school food environment, building on the NCI's extensive experiences in rating

state tobacco control policies. Separate policy ratings have been developed for each area, and state policies in effect as of December 31, 2003 have been collected and rated. The processes for developing and applying these two ratings systems to state policies for schools are described in these papers—PE-related policies in one and the other for policies related to the school nutrition environment. The development of both ratings systems was informed by reviews of the scientific and other relevant literatures and through consultations with expert panels and other selected experts. Policies, both statutes and regulations, were obtained from the Westlaw database for all 50 states and Washington DC.

The PE-related state policy ratings focused on five areas: PE time requirements, staffing requirements, curriculum standards, the assessment of health-related fitness, and recess time. The school nutrition policy rating system was more extensive, consisting of eleven topics, including competitive food policies targeting availability of *à la carte* items in cafeterias, vending machines, or other venues; reimbursable school meals and the school meal environment; food service director qualifications; nutrition education; food/beverage marketing; preferential pricing strategies; BMI screening; and mandated or recommended coordinating/advisory councils and/or plans. Policies in each topic area were given more points based on whether the policies were more extensive/comprehensive in ways expected to increase physical activity or improve student nutrition. For the physical activity–related policies, those setting staffing requirements were most extensively implemented across states, followed by those establishing PE time requirements, while those addressing recess time (for elementary schools only) were least extensive. On the nutrition side, most states had policies requiring some nutrition education, while a few, about one third, had policies targeting competitive foods. State policies addressing other topics were less prevalent, with no states having policies in effect at the end of 2003 focused on some areas (e.g., food/beverage marketing and preferential pricing of healthier foods and beverages). It is likely that both state policies adopted in these areas, and their degree of implementation, will expand in the coming years. The continued tracking/rating of these policies by NCI; the identification, tracking, and rating of other potentially relevant policies in the ImpacTeen project; and the continued assessment of their implementation in schools through the YES survey should help both to measure and stimulate progress in this area.

### Discussion

Extensive research has demonstrated the importance of a range of policy, programmatic, and other environmental influences in affecting health behaviors. The

Bridging the Gap program created 10 years ago and supported by the Robert Wood Johnson Foundation—and other spin-off projects from this effort—have made numerous contributions to the evidence base on the impact of these factors on adolescent tobacco, alcohol, and illicit drug use and related outcomes. The accumulation of this evidence has been a critical factor in the development and implementation of effective strategies to reduce youth substance use and abuse. More recently, BTG has been applying a similar approach to adolescent obesity and the physical inactivity and/or poor dietary habits that are its primary causes. This supplement features some of BTG's early research on these issues, along with other important work on the policy and environmental determinants of obesity.

The papers contained in this supplement highlight the importance of contextual influences as determinants of adolescent physical activity, healthy eating, and weight. Moreover, they emphasize the disparities that exist in these factors and outcomes among different racial/ethnic and socioeconomic groups. BTG research suggests that interventions targeting obesity will be particularly effective among the subgroups most at risk. Adolescents in high-minority, low-income areas have fewer opportunities for physical activity and more limited options for healthy foods (and relatively more for unhealthy foods), both in schools and throughout their communities and, consequently, are more likely to be at unhealthy weight. Minority youth also are more exposed to food advertising on television and in their schools.

While awareness of the obesity epidemic is growing, state policymakers and local health departments have been slow to adopt comprehensive policies and programs targeting the environments and behaviors that cause obesity. Nevertheless, actions to address the obesity epidemic are being taken at all levels of government, as well as throughout the private sector. Clearly the issue has grown in the national consciousness. The evidence base to which BTG and many others are contributing should reinforce these efforts and help shape them in ways that maximize their effectiveness. They will also help to track progress that is, or is not, being made in changing key contextual influences in the schools, in communities, in the states, and in the media. Clearly, there are multiple influences that help to account for the growing obesity epidemic, as well as for the disparities in overweight as a function of race/ethnicity and SES. An effective societal response will depend on the recognition of what these complex and multiple influences are, an understanding of their levels in the population of youth and disparities in those levels, hopefully followed by a demand for change in many of them and for the reduction of the disparities found.

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