Lessons Learned from the Diffusion of Effective Behavioral Interventions Program for Childhood Obesity Interventions

BEN SPOER, MPH^a
ROBERT FULLILOVE, EDD^b

Why do childhood obesity interventions produce such tepid results? In 2006, Helen Thomas, a faculty member at McMaster University in Ontario, Canada, attempted to answer this question through a review of childhood obesity interventions.¹ Planet Health, a two-year classroom intervention targeting sixth- and seventh-graders, was among the interventions Thomas reviewed and is a prime example of the lackluster results these interventions tend to produce. Planet Health's goals were to reduce participants' television viewing time, improve their diet, and increase the amount they exercised. The intervention's results were mixed: it reduced obesity prevalence and increased healthy eating in girls; however, it did not have any effect on obesity status or healthy eating among boys and had no effect on exercise for either sex.² These results were clinically modest, and the reduction in obesity among girls was not substantial enough to indicate that the intervention would have a meaningful effect on childhood obesity at the population level. Unfortunately, Planet Health is one of the most successful childhood obesity interventions Thomas reviewed.

Like Planet Health, many other childhood obesity interventions returned results that were clinically modest and only effective for one subgroup. Some programs had an effect only on boys, others only on girls, some only on white children, and still others only on individuals of a certain socioeconomic status.³⁻⁶ Some interventions had a paradoxical effect, increasing participants' body mass index.^{5,7} High-impact positive outcomes have been so elusive that one review recommended limiting intervention groups to participants who volunteer, essentially encouraging selection bias to ensure results.⁸ Thomas was not the first, nor the last, to find that many childhood obesity interventions produce at best underwhelming results.⁹⁻¹²

Each of these childhood obesity interventions failed for a reason. That reason could be some feature of the intervention's design or implementation, the food environment in which the intervention took place, a lack of accessible physical activity opportunities for intervention participants, or various other factors. When considering the effectiveness of these interventions, there are important lessons to be learned from the Centers for Disease Control and Prevention's

^aNew York University, College of Global Public Health, New York, NY

^bColumbia University Mailman School of Public Health, Department of Sociomedical Sciences, New York, NY

Address correspondence to: Ben Spoer, MPH, New York University, College of Global Public Health, 41 E 11th St., 7th Fl., New York, NY 10009; tel. 510-387-7374; e-mail <bs3016@nyu.edu>.

©2015 Association of Schools and Programs of Public Health

(CDC)'s Diffusion of Effective Behavioral Interventions program (DEBI), which evaluates effective behavioral interventions.

HISTORY OF DEBI

The DEBI program was designed to address the need for effective, evidence-based human immunodeficiency virus (HIV) prevention programs. In the late 1990s, CDC identified several efficacious HIV interventions and packaged them in such a way that nongovernmental organizations and other community organizations could access them easily. CDC published the interventions in 1999 and has made updates annually since; as of February 2015, more than 60 interventions were available through the DEBI project, now known as the High Impact HIV Prevention program.¹³

However, the organizations that received funding and training through the DEBI program rarely implemented interventions exactly as CDC packaged them. While the number of changes made varied among programs, researchers have documented that many, if not most, of these programs were altered in some way by their implementing organizations.¹⁴ These changes were often intended to make the program a better fit to the implementing organization's social, physical, cultural, and political surroundings. Although CDC did not necessarily anticipate these changes, DEBI program staff members quickly made efforts to accommodate feedback from implementing organizations, seeing value in "the experiences and expertise of valued partners with years of experience working in HIV prevention in communities."¹⁵ The changes were to the program location, the amount of the intervention delivered, the participant incentives, and occasionally the content of the interventions themselves. For example, a review of one intervention found that nearly half of the organizations implementing the intervention focused on ages substantially different from the age range in the original intervention distributed by CDC.¹⁶ A study of DEBI programs in Maryland and Massachusetts found that alterations to DEBI programs included changes to the way the programs disseminated their interventions, changes to how they integrated their interventions into the community, and tailoring of these interventions to assimilate them into preexisting programs. Alterations were also made to adapt these programs to community sensitivities, various racial/ethnic minority groups, and other concerns. These adaptations are typical of the changes made by implementing organizations, and the DEBI-inspired programs in both states were proven effective over time.¹⁷

Reviews of adapted interventions have found most

to be effective, and some authors have found that the adaptations made to DEBIs have improved these interventions' outcomes and, therefore, encouraged such adaptations.^{14,16,17} However, not all adaptations to such programs are improvements, and some adaptations, especially changes to intervention content, can reduce fidelity (i.e., the degree to which an intervention is implemented as intended by its creators). By 2009, researchers had identified HIV interventions' degree of fit to their environmental context as an important common factor in effective HIV programming, implying that effective adaptations to these interventions that do not reduce fidelity could be an overall benefit.¹⁸

DEBIs have played a major role in the U.S. HIV prevention initiative. The program has provided health departments with the necessary guidance to implement these interventions and adapt them to the locations in which they take place.¹⁹ Their widespread use and adaptation is a testament to their success.²⁰ With their success after modification in mind, one of the major lessons learned from the DEBIs initiative is that interventions targeted at complex public health issues can be more successful if the environmental context (i.e., social, political, and economic) is allowed to play a role in their implementation.^{21,22}

CONNECTING DEBI TO CHILDHOOD OBESITY

The childhood obesity and HIV epidemics are analogous in that both epidemics have complex etiologies that make interventions more difficult. The structural approach to HIV/acquired immunodeficiency syndrome (AIDS) exemplifies the complexity of the disease's epidemiology, as research has shown that not only do biology and behavior play into HIV/AIDS incidence, but so do urban decay, police practices, and myriad other factors.²³ The methods for quantifying the structural determinants of obesity, including walkability, neighborhood safety, and the food environment, have not yet been standardized, although researchers agree that these factors play a role in individuals' weight status.²⁴⁻²⁸ A child's likelihood of being obese can also be affected by social factors (e.g., the body size of the people around her), family factors (e.g., her mother's mental health), and individual factors (e.g., whether or not she becomes a teen mother).²⁹⁻³¹ Taken together, these factors contribute to the so-called obesogenic environment that might influence a child's weight.³²

Considering the social and physical contributors to the obesogenic environment, one would expect that these factors had been taken into account in designing interventions in the same way that these factors were taken into account for DEBI interventions. However, a

close examination of childhood obesity reviews shows that the majority of interventions do not make an effort to accommodate the environmental context in which they take place. Most interventions try to add some amount of exercise or health education to the lives of the children who partake in the intervention, under the assumption that more exercise or education will reduce obesity.

For example, the Planet Health intervention attempted to take environmental factors into account by involving stakeholders (e.g., teachers and parents) in the program.³³ However, the intervention may not have done enough to account for the neighborhood in which it took place. It did not, for example, examine neighborhood walkability or safety, nor did it offer training on how or where to shop for healthy foods. The modest but positive results Planet Health produced can be credited, at least in part, to the degree to which the program involved efforts that went beyond changing risk behaviors. However, we posit that if Planet Health and other similar interventions took more socio-environmental features into their design and implementation, they would see better results.

Some childhood obesity interventions are subject to the same lack of environmental influence that DEBIs were subject to before local organizations tailored them to their sites; some interventions treat unhealthy children without appropriate regard to their social and physical surroundings. While no data exist, there is some evidence to suggest that increasing community involvement in childhood obesity interventions improves their results.³⁴

The lesson from DEBI is that intervening on the specific social and physical environment is critical to successful interventions on complex public health problems. The effectiveness of these interventions may be improved if locally situated actors have greater influence over the implementation of these interventions. To that end, some authors have called for a centralized intervention dissemination initiative for childhood obesity, which could help better incorporate actors' feedback into these interventions as occurred with the DEBI project.³⁵ Although it may be difficult to find enough efficacious childhood obesity interventions to populate such an initiative, the DEBI project has taught us that successfully intervening on complex public health problems, such as HIV/AIDS and childhood obesity, requires allowing the environmental factors of the context in which the intervention takes place to play a role in the intervention's implementation. It is time to more thoroughly incorporate these factors into childhood obesity interventions, because they may be the missing step in addressing childhood obesity.

REFERENCES

1. Thomas H. Obesity prevention programs for children and youth: why are their results so modest? *Health Educ Res* 2006;21:783-95.
2. Gortmaker SL, Peterson K, Wiecha J, Sobol AM, Dixit S, Fox MK, et al. Reducing obesity via a school-based interdisciplinary intervention among youth: Planet Health. *Arch Pediatr Adolesc Med* 1999;153:409-18.
3. Sallis JF, McKenzie TL, Conway TL, Elder JP, Prochaska JJ, Brown M, et al. Environmental interventions for eating and physical activity: a randomized controlled trial in middle schools. *Am J Prev Med* 2003;24:209-17.
4. Mo-suwan L, Pongprapai S, Junjana C, Puetpaiboon A. Effects of a controlled trial of a school-based exercise program on the obesity indexes of preschool children. *Am J Clin Nutr* 1998;68:1006-11.
5. Williams CL, Strobino BA, Bollella M, Brotanek J. Cardiovascular risk reduction in preschool children: the "Healthy Start" project. *J Am Coll Nutr* 2004;23:117-23.
6. Plachta-Danielzik S, Pust S, Asbeck I, Czerwinski-Mast M, Langnase K, Fischer C, et al. Four-year follow-up of school-based intervention on overweight children: the KOPS Study. *Obesity (Silver Spring)* 2007;15:3159-69.
7. Ask AS, Hernes S, Aarek I, Johannessen G, Haugen M. Changes in dietary pattern in 15 year old adolescents following a 4 month dietary intervention with school breakfast—a pilot study. *Nutr J* 2006;5:33.
8. Stice E, Shaw H, Marti CN. A meta-analytic review of obesity prevention programs for children and adolescents: the skinny on interventions that work. *Psychol Bull* 2006;132:667-91.
9. Harris KC, Kuramoto LK, Schulzer M, Retallack JE. Effect of school-based physical activity interventions on body mass index in children: a meta-analysis. *CMAJ* 2009;180:719-26.
10. Summerbell CD, Waters E, Edmunds LD, Kelly S, Brown T, Campbell KJ. Interventions for preventing obesity in children. *Cochrane Database Syst Rev* 2005;(3):CD001871.
11. Kamath CC, Vickers KS, Ehrlich A, McGovern L, Johnson J, Singhal V, et al. Clinical review: behavioral interventions to prevent childhood obesity: a systematic review and metaanalyses of randomized trials. *J Clin Endocrinol Metab* 2008;93:4606-15.
12. Brown T, Summerbell C. Systematic review of school-based interventions that focus on changing dietary intake and physical activity levels to prevent childhood obesity: an update to the obesity guidance produced by the National Institute for Health and Clinical Excellence. *Obes Rev* 2009;10:110-41.
13. Effective Interventions. About DEBI [cited 2014 Mar 16]. Available from: URL: <http://www.effectiveinterventions.org/en/aboutdebi.aspx>
14. Feldman MB, Silapaswan A, Schaefer N, Schermele D. Is there life after DEBI? Examining health behavior maintenance in the Diffusion of Effective Behavioral Interventions initiative. *Am J Community Psychol* 2014;53:286-313.
15. Collins C, Harshbarger C, Sawyer R, Hamdallah M. The diffusion of effective behavioral interventions project: development, implementation, and lessons learned. *AIDS Educ Prev* 2006;18(4 Suppl A):5-20.
16. Rebchook GM, Kegeles SM, Huebner D; TRIP Research Team. Translating research into practice: the dissemination and initial implementation of an evidence-based HIV prevention program. *AIDS Educ Prev* 2006;18(4 Suppl A):119-36.
17. Shea MA, Callis BP, Cassidy-Stewart H, Cranston K, Tomoyasu N. Diffusion of effective HIV prevention interventions—lessons from Maryland and Massachusetts. *AIDS Educ Prev* 2006;18(4 Suppl A):96-107.
18. Rotheram-Borus MJ, Swendeman D, Flannery D, Rice E, Adamson DM, Ingram B. Common factors in effective HIV prevention programs. *AIDS Behav* 2009;13:399-408.
19. McKleroy VS, Galbraith JS, Cummings B, Jones P, Harshbarger C, Collins C, et al. Adapting evidence-based behavioral interventions for new settings and target populations. *AIDS Educ Prev* 2006;18(4 Suppl A):59-73.
20. National Alliance of State and Territorial AIDS Directors, Kaiser Family Foundation. The National HIV prevention inventory: the state of HIV prevention across the U.S. Menlo Park (CA): Kaiser Family Foundation; 2009.
21. Anderson LM, Scrimshaw SC, Fullilove MT, Fielding JE; Task Force on Community Preventive Services. The Community Guide's

- model for linking the social environment to health. *Am J Prev Med* 2003;24(3 Suppl):12-20.
22. Institute of Medicine. Health and behavior: the interplay of biological, behavioral, and societal influences. Washington: National Academies Press; 2001.
 23. Rhodes T, Singer M, Bourgois P, Friedman SR, Strathdee SA. The social structural production of HIV risk among injecting drug users. *Soc Sci Med* 2005;61:1026-44.
 24. Lovasi GS, Schwartz-Soicher O, Quinn JW, Berger DK, Neckerman KM, Jaslow R, et al. Neighborhood safety and green space as predictors of obesity among preschool children from low-income families in New York City. *Prev Med* 2013;57:189-93.
 25. Smith KR, Brown BB, Yamada I, Kowaleski-Jones L, Zick CD, Fan JX. Walkability and body mass index density, design, and new diversity measures. *Am J Prev Med* 2008;35:237-44.
 26. Papas MA, Alberg AJ, Ewing R, Helzlouer KJ, Gary TL, Klassen AC. The built environment and obesity. *Epidemiol Rev* 2007;29:129-43.
 27. Rundle A, Neckerman KM, Freeman L, Lovasi GS, Purciel M, Quinn J, et al. Neighborhood food environment and walkability predict obesity in New York City. *Environ Health Perspect* 2009;117:442-7.
 28. Beaulac J, Kristjansson E, Cummins S. A systematic review of food deserts, 1966–2007. *Prev Chronic Dis* 2009;6:A105.
 29. Bagrowicz R, Watanabe C, Umezaki M. Is obesity contagious by way of body image? A study on Japanese female students in the United States. *J Community Health* 2013;38:834-7.
 30. Ramasubramanian L, Lane S, Rahman A. The association between maternal serious psychological distress and child obesity at 3 years: a cross-sectional analysis of the UK Millennium Cohort Data. *Child Care Health Dev* 2013;39:134-40.
 31. Chang T, Choi H, Richardson CR, Davis MM. Implications of teen birth for overweight and obesity in adulthood. *Am J Obstet Gynecol* 2013;209:110.e1-7.
 32. Egger G, Swinburn B. An “ecological” approach to the obesity pandemic. *BMJ* 1997;315:477-80.
 33. Franks A, Kelder SH, Dino GA, Horn KA, Gortmaker SL, Wiecha JL, et al. School-based programs: lessons learned from CATCH, Planet Health, and Not-On-Tobacco. *Prev Chronic Dis* 2007;4:A33.
 34. Davison KK, Jurkowski JM, Li K, Kranz S, Lawson HA. A childhood obesity intervention developed by families for families: results from a pilot study. *Int J Behav Nutr Phys Act* 2013;10:3.
 35. Owen N, Glanz K, Sallis JF, Kelder SH. Evidence-based approaches to dissemination and diffusion of physical activity interventions. *Am J Prev Med* 2006;31(4 Suppl):S35-44.