This revised and updated fifth edition of the highly acclaimed “gold standard” textbook continues to provide a foundational review of health behavior change theories, research methodologies, and intervention strategies across a range of populations, age groups, and health conditions. It examines numerous, complex, and often co-occurring factors that can both positively and negatively influence people’s ability to change behaviors to enhance their health including intrapersonal, interpersonal, sociocultural, environmental, systems, and policy factors, in the context of leading theoretical frameworks. Beyond understanding predictors and barriers to achieving meaningful health behavior change, the Handbook provides an updated review of the evidence base for novel and well-supported behavioral interventions and offers recommendations for future research.

New content includes chapters on Sun Protection, Interventions With the Family System, and the Role of Technology in Behavior Change. Throughout the textbook, updated reviews emphasize mobile health technologies and electronic health data capture and transmission and a focus on implementation science. And the fifth edition, like the previous edition, provides learning objectives to facilitate use by course instructors in health psychology, behavioral medicine, and public health.

The Handbook of Health Behavior Change, Fifth Edition, is a valuable resource for students at the graduate and advanced undergraduate level in the fields of public or population health, medicine, behavioral science, health communications, medical sociology and anthropology, preventive medicine, and health psychology. It also is a great resource for clinical investigators, behavioral and social scientists, and healthcare practitioners who grapple with the challenges of supporting individuals, families, and systems when trying to make impactful health behavior change.

NEW TO THE FIFTH EDITION:
• Revised and updated to encompass the most current research and empirical evidence in health behavior change
• Includes new chapters on Sun Protection, Interventions With the Family System, and the Role of Technology in Behavior Change
• Increased focus on innovations in technology in relation to health behavior change research and interventions

KEY FEATURES:
• The most comprehensive review of behavior change interventions
• Provides practical, empirically based information and tools for behavior change
• Focuses on robust behavior theories, multiple contexts of health behaviors, and the role of technology in health behavior change
• Applicable to a wide variety of courses including public health, behavior change, preventive medicine, and health psychology
• Organized to facilitate curriculum development and includes tools to assist course instructors, including learning objectives for each chapter
The Handbook of Health Behavior Change
Marisa E. Hilliard, PhD, is Assistant Professor of Pediatrics in the Psychology Section at Baylor College of Medicine and Texas Children’s Hospital. Dr. Hilliard received her PhD in Clinical Psychology at The Catholic University of America and her postdoctoral training in the Center for the Promotion of Treatment Adherence and Self-Management at Cincinnati Children’s Hospital Medical Center. She is the Principal Investigator or Co-Investigator on research grants from the National Institutes of Health and the Leona M. and Harry B. Helmsley Charitable Trust. Much of Dr. Hilliard’s research focuses on assessment and intervention strategies to support self-management, enhance quality of life, and promote optimal health outcomes among young people with type 1 diabetes and their families. Her research emphasizes strengths-based approaches to foster diabetes-related resilience, with work spanning early childhood through early adulthood. Dr. Hilliard is also actively involved in efforts to educate medical and mental health professionals about the psychological aspects of diabetes in order to improve patient and family access to high-quality behavioral healthcare.

Kristin A. Riekert, PhD, is Associate Professor of Medicine in the Division of Pulmonary and Critical Care Medicine, Department of Medicine at The Johns Hopkins University, and the Director of the Johns Hopkins Adherence Research Center. Dr. Riekert received her PhD in Clinical Psychology from Case Western Reserve University where she specialized in pediatric psychology. She completed postdoctoral training in health psychology at The Johns Hopkins University. Dr. Riekert is Principal Investigator or Co-Investigator on several National Institutes of Health- and foundation-sponsored intervention trials focused on improving adherence and health outcomes in cystic fibrosis, asthma, chronic kidney disease, sickle cell disease, and secondhand smoke reduction. Additionally, she studies doctor–patient communication, healthcare disparities, and implementation of interventions into clinical practice.

Judith K. Ockene, PhD, MEd, MA, is a tenured Professor of Medicine and Chief of the Division of Preventive and Behavioral Medicine, University of Massachusetts Medical School. She holds the Barbara Helen Smith Chair in Preventive and Behavioral Medicine and is the Associate Vice Provost for Gender and Equity. Dr. Ockene is the recipient of numerous National Institutes of Health grants funding research in the prevention of illness and disability and the promotion of health and quality of life for individuals and communities. Much of her research addresses behaviors of tobacco, alcohol, and weight management; women’s health; and training physicians and medical students how to counsel patients for behavior change. She also teaches medical, graduate, and public health students and clinicians how to help patients make lifestyle changes. Dr. Ockene has more than 250 peer-reviewed publications and was a scientific editor of two Surgeon General’s Reports on Smoking and Health. She is a past member of the U.S. Preventive Services Task Force and past President of the Society of Behavioral Medicine. Dr. Ockene has received several school, state, and national mentoring and research awards, including the Society of Behavioral Medicine Distinguished Mentor Award in 2009 and the Society of Behavioral Medicine’s Distinguished Scientist Award in 2014.

Lori Pbert, PhD, is a tenured Professor of Medicine and Associate Chief of the Division of Preventive and Behavioral Medicine in the Department of Medicine at the University of Massachusetts Medical School (UMMS). She is the Director of the Center for Tobacco Treatment Research and Training and of the UMMS Tobacco Treatment Specialist Training and Certification Program. Dr. Pbert is a clinical psychologist and clinical and translational researcher with more than 25 years of experience in leading clinical and community-based trials. Her National Institutes of Health-funded research program is focused on the design and evaluation of pragmatic behavioral interventions for health promotion and health risk behavior change in youth and adults delivered in real-world settings and in optimizing clinical–community linkages. Dr. Pbert’s areas of expertise include tobacco and obesity prevention and treatment, and the application of mindfulness training to health behavior change and chronic disease management. Dr. Pbert teaches medical and graduate students, physicians, and other healthcare providers in the theory and practice of health behavior change. She is a fellow in the Society of Behavioral Medicine and a founding member of the American Academy of Pediatrics Center for Child Health Research Tobacco Consortium.
This book is dedicated to all the people and families who work hard to maintain a healthy lifestyle and take care of their loved ones’ health in the midst of multiple personal, social, and cultural challenges, and to the healthcare professionals who work tirelessly to help their patients and communities live healthier lives.
## Contents

<table>
<thead>
<tr>
<th>Contributors</th>
<th>Preface</th>
<th>I. THEORETICAL MODELS OF HEALTH BEHAVIOR CHANGE</th>
<th>II. BARRIERS TO AND FACILITATORS OF LIFESTYLE CHANGE AND DISEASE MANAGEMENT</th>
<th>III. LIFESTYLE CHANGE/DISEASE PREVENTION INTERVENTIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Contents</td>
<td>xi</td>
<td>1. Individual Theories 3</td>
<td>3. Psychosocial Predictors of Behavior Change 51</td>
<td>6. Dietary Behavior Change 133</td>
</tr>
<tr>
<td>Authors</td>
<td></td>
<td>Mary R. Janevic and Cathleen M. Connell</td>
<td>Summer L. Williams and Kelly B. Haskard-Zolnierek</td>
<td>Cynthia A. Thomson and Craig Johnston</td>
</tr>
<tr>
<td>Authors</td>
<td></td>
<td>4. Developmental Influences on Behavior Change: Children, Adolescents, Emerging Adults, and the Elderly 75</td>
<td>Crystal S. Lim, Elizabeth M. Schneider, and David M. Janicke</td>
<td>Jylana L. Sheats, Sandra J. Winter, Lauren A. Grieco, and Abby C. King</td>
</tr>
<tr>
<td></td>
<td></td>
<td>5. Culture, Behavior, and Health 103</td>
<td></td>
<td>8. Skin Cancer and Melanoma Prevention: Ultraviolet Radiation Exposure, Tanning, and Sun Protection 177</td>
</tr>
<tr>
<td>Authors</td>
<td></td>
<td></td>
<td></td>
<td>Jennifer M. Taber and Sarah Ann Hayes</td>
</tr>
<tr>
<td>Contributors</td>
<td>xi</td>
<td></td>
<td></td>
<td>©Springer Publishing Company</td>
</tr>
</tbody>
</table>
9. Addressing Tobacco Use and Dependence 197  
   Lori Pbert, Denise Jolicoeur, Brianna L. Haskins, and Judith K. Ockene

10. Alcohol Prevention and Treatment: Interventions for Hazardous, Harmful, and Dependent Drinkers 223  
   Emma Geijer-Simpson, Ruth McGovern, and Eileen Kaner

11. Reducing Stress to Improve Health 243  
   David J. Finitsis, Ellen A. Dornelas, Jonathan Gallagher, and Hannah Janis

12. Building a Science for Multiple-Risk Behavior Change 265  
   Judith J. Prochaska, Janice M. Prochaska, and James O. Prochaska

IV. CHRONIC DISEASE MANAGEMENT INTERVENTIONS

13. Chronic Disease Management Interventions: Cardiovascular Disease 293  
   Laura L. Hayman

14. Diabetes Management Behaviors: The Key to Optimal Health and Quality of Life Outcomes 309  
   Korey K. Hood, Jennifer K. Raymond, Rebecca N. Adams, Molly L. Tanenbaum, and Michael A. Harris

15. Behavioral Management of Chronic Respiratory Diseases: Examples From Asthma and Chronic Obstructive Pulmonary Disease 329  
   Kristin A. Riekert and Michelle N. Eakin

16. Chronic Infectious Disease Management Interventions 349  
   Scott D. Rhodes, Aimee M. Wilkin, Claire Abraham, Timothy S. Oh, and Laura H. Bachmann

17. Adherence to Treatment and Lifestyle Changes Among People With Cancer 365  
   Amy H. Peterman, David Victorson, and David Cella

18. Obesity 381  
   Rachel W. Goode, Yang Yu, and Lora E. Burke

V. INTERVENTIONS TO SUPPORT HEALTH BEHAVIOR CHANGE ACROSS SYSTEMS

19. Interventions With the Family System 405  
   Emily R. Hamburger, Lindsay S. Mayberry, Kimberly L. Savin, and Sarah S. Jaser

20. School Interventions to Support Health Behavior Change 421  
   Rebekka M. Lee and Steven L. Gortmaker

21. Prevention of Chronic Disease at the Worksite 437  
   Stephanie C. Lemon, Elizabeth Ablah, and Barbara Estabrook
22. Healthcare Provider and System Interventions Promoting Health Behavior Change 459
   Anne C. Dobmeyer, Jeffrey L. Goodie, and Christopher L. Hunter

23. The Role of the Built Environment in Supporting Health Behavior Change 481
   Angie L. Cradock

VI. HEALTH BEHAVIOR CHANGE RESEARCH METHODOLOGY

24. Principles of Health Behavior Measurement 507
   Rachel M. Wasserman and Marisa E. Hilliard

25. Role of Technology in Behavior Change to Expand Reach and Impact on Public Health 525
   Bradford W. Hesse, Ellen Beckjord, and David K. Ahern

Index 545
Contributors

Elizabeth Ablah, PhD, MPH, Associate Professor, Department of Preventive Medicine and Public Health, University of Kansas School of Medicine-Wichita, Wichita, Kansas

Claire Abraham, MD, Morgan Stanley Children’s Hospital, Columbia University Medical Center, New York, New York

Rebecca N. Adams, PhD, Department of Pediatrics, Division of Endocrinology and Diabetes, Stanford University School of Medicine, Palo Alto, California

David K. Ahern, PhD, Brigham & Women’s Hospital, Boston, Massachusetts

Laura H. Bachmann, MD, MPH, Department of Internal Medicine, Wake Forest School of Medicine, Winston-Salem, North Carolina

Ellen Beckjord, PhD, MPH, UPMC Health Plan, Pittsburgh, Pennsylvania

Bridget Brush, Department of Psychology, DePaul University, Chicago, Illinois

Lora E. Burke, PhD, MPH, FAAN, FAHA, School of Nursing, University of Pittsburgh, Pittsburgh, Pennsylvania

Joanna Buscemi, PhD, Department of Psychology, DePaul University, Chicago, Illinois

David Cella, PhD, Professor and Chair, Department of Medical Social Sciences, Feinberg School of Medicine, Northwestern University, Chicago, Illinois

Cathleen M. Connell, PhD, Professor, Department of Health Behavior and Health Education, University of Michigan School of Public Health, Ann Arbor, Michigan

Molly Cory, BS, Department of Psychology, DePaul University, Chicago, Illinois

Angie L. Cradock, ScD, MPE, Department of Social and Behavioral Sciences, Harvard T.H. Chan School of Public Health, Boston, Massachusetts

Anne C. Dobmeyer, PhD, ABPP, Psychological Health Center of Excellence, Defense Health Agency, Silver Spring, Maryland
Ellen A. Dornelas, PhD, Hartford Healthcare Cancer Institute, University of Connecticut School of Medicine, Hartford, Connecticut

Michelle N. Eakin, PhD, Associate Professor, Co-Director of the Johns Hopkins Adherence Research Center, Johns Hopkins School of Medicine, Baltimore, Maryland

Barbara Estabrook, MSPH, Research Program Director, Division of Preventive and Behavioral Medicine, University of Massachusetts Medical School, Worcester, Massachusetts

David J. Finitsis, Hartford HealthCare Cancer Institute, Hartford, Connecticut; Yale University School of Medicine, New Haven, Connecticut

Marian L. Fitzgibbon, PhD, Department of Pediatrics, Institute for Health Research and Policy, University of Illinois at Chicago, Chicago, Illinois

Jonathan Gallagher, BA, MPSYCHSC, Department of Psychology, Beaumont Hospital, Dublin, Ireland

Emma Geijer-Simpson, MSc, PhD student, Institute of Health and Society, University of Newcastle upon Tyne, UK

Rachel W. Goode, PhD, MPH, LCSW, Assistant Professor, School of Social Work, University of North Carolina, Chapel Hill, North Carolina

Jeffrey L. Goodie, PhD, ABPP, Department of Medical and Clinical Psychology, Uniformed Services University, Bethesda, Maryland

Steven L. Gortmaker, Harvard T.H. Chan School of Public Health, Department of Social and Behavioral Sciences, Boston, Massachusetts

Lauren A. Grieco, PhD, Head of Behavioural Science Lab, Nokia Technologies, San Francisco, California

Emily R. Hamburger, MEd, Vanderbilt University Medical Center, Nashville, Tennessee

Michael A. Harris, PhD, Oregon Health and Science University, Portland, Oregon

Kelly B. Haskard-Zolnierek, PhD, Department of Psychology, Texas State University, San Marcos, Texas

Brianna L. Haskins, MS, Department of Emergency Medicine, University of Massachusetts Medical School, Worcester, Massachusetts

Sarah Ann Hayes, BA, Department of Psychological Sciences, Kent State University, Kent, Ohio

Laura L. Hayman, PhD, MSN, FAAN, Professor, Department of Nursing, College of Nursing and Health Sciences, University of Massachusetts-Boston; Adjunct Professor of Medicine, Division of Preventive and Behavioral Medicine, University of Massachusetts Medical School, Worcester, Massachusetts
Bradford W. Hesse, PhD, National Cancer Institute, National Institutes of Health, Rockville, Maryland

Marisa E. Hilliard, PhD, Baylor College of Medicine and Texas Children’s Hospital, Houston, Texas

Korey K. Hood, PhD, Stanford University School of Medicine, Palo Alto, California

Christopher L. Hunter, PhD, ABPP, Defense Health Agency, Falls Church, Virginia

Anjana Jagpal, DePaul University, Chicago, Illinois

Mary R. Janevic, PhD, MPH, Department of Health Behavior and Health Education, University of Michigan School of Public Health, Ann Arbor, Michigan

David M. Janicke, PhD, ABPP, Department of Clinical and Health Psychology, University of Florida, Gainesville, Florida

Hannah Janis, BA, Hartford Healthcare Cancer Institute, Hartford, Connecticut

Sarah S. Jaser, PhD, Associate Professor, Department of Pediatrics, Vanderbilt University Medical Center, Nashville, Tennessee

Denise Jolicoeur, MPH, CHES, Division of Preventive and Behavioral Medicine, University of Massachusetts Medical School, Worcester, Massachusetts

Craig Johnston, PhD, Assistant Professor, University of Houston, Department of Health and Human Performance, Houston, Texas

Eileen Kaner PhD, HonFRCP, HonMFPH, Professor of Public Health and Primary Care Research, Institute of Health and Society, University of Newcastle upon Tyne, UK

Abby C. King, PhD, Stanford University School of Medicine, Stanford, California

Angela Kong, PhD, University of Illinois at Chicago, Chicago, Illinois

Rebekka M. Lee, ScD, Research Scientist, Department of Social and Behavioral Sciences, Harvard T.H. Chan School of Public Health, Boston, Massachusetts

Stephenie C. Lemon, PhD, Division of Preventive and Behavioural Medicine, University of Massachusetts Medical School, Worcester, Massachusetts

Crystal S. Lim, PhD, Department of Psychiatry and Human Behavior, University of Mississippi Medical Center, Jackson, Mississippi

Lindsay S. Mayberry, MS, PhD, Assistant Professor, Department of Medicine, Division of General Internal Medicine and Public Health, Center for Health Behavior and Health Education, Vanderbilt University Medical Center, Nashville, Tennessee

Ruth McGovern, PhD, NIHR postdoctoral Research Fellow, Institute of Health and Society, University of Newcastle upon Tyne, UK
Judith K. Ockene, PhD, MEd, MA, Division of Preventive and Behavioral Medicine, University of Massachusetts Medical School, Worcester, Massachusetts

Timothy S. Oh, BS, Wake Forest School of Medicine, Winston-Salem, North Carolina

Lori Pbert, PhD, Division of Preventive and Behavioral Medicine, University of Massachusetts Medical School, Worcester, Massachusetts

Amy H. Peterman, PhD, Health Psychology PhD Program, Department of Psychological Science, University of North Carolina-Charlotte, Charlotte, North Carolina

James O. Prochaska, PhD, University of Rhode Island, Mill Valley, California

Janice M. Prochaska, PhD, Prochaska Change Consultants, Mill Valley, California

Judith J. Prochaska, PhD, MPH, Associate Professor of Medicine, Stanford Prevention Research Center, Department of Medicine, Stanford University, Stanford, California

Jennifer K. Raymond, MD, MCR, Children’s Hospital Los Angeles, University of Southern California, Los Angeles, California

Scott D. Rhodes, PhD, MPH, Department of Social Sciences and Health Policy, Wake Forest School of Medicine, Winston-Salem, North Carolina

Kristin A. Riekert, PhD, Associate Professor, Director of the Johns Hopkins Adherence Research Center, Johns Hopkins School of Medicine, Baltimore, Maryland

Milagros C. Rosal, MS, PhD, Division of Preventive and Behavioral Medicine, Department of Medicine, University of Massachusetts Medical School, Worcester, Massachusetts

Kimberly L. Savin, BA, Vanderbilt University Medical Center, Nashville, Tennessee

Elizabeth M. Schneider, PhD, Multi Health Systems, Toronto, Ontario, Canada

Jylana L. Sheats, PhD, MPH, Tulane University School of Public Health and Tropical Medicine, Global Community Health and Behavioral Sciences Department, New Orleans, Louisiana

Valerie J. Silfee, PhD, UPMC Health Plan, Pittsburgh, Pennsylvania

Jennifer M. Taber, PhD, Department of Psychological Sciences, Kent State University, Kent, Ohio

Molly L. Tanenbaum, PhD, Department of Pediatrics, Division of Endocrinology and Diabetes, Stanford University School of Medicine, Palo Alto, California

Cynthia A. Thomson, PhD, RDN, Professor, The University of Arizona, Tucson, Arizona

Lisa Tussing-Humphreys, PhD, Department of Medicine, University of Illinois at Chicago, Chicago, Illinois
David Victorson, PhD, Associate Professor, Department of Medical Social Sciences, Feinberg School of Medicine, Northwestern University, Chicago, Illinois

Monica L. Wang, ScD, MS, Department of Community Health Sciences, Boston University School of Public Health, Boston, Massachusetts

Rachel M. Wasserman, PhD, Nemours Children’s Hospital, Orlando, Florida

Aimee M. Wilkin, MD, MPH, Department of Internal Medicine, Wake Forest School of Medicine, Winston-Salem, North Carolina

Summer L. Williams, MS, PhD, Associate Professor, Westfield State University, Westfield, Massachusetts

Sandra J. Winter, PhD, MHA, Stanford Preventing Research Center, Stanford University School of Medicine, Palo Alto, California

Yang Yu, MsN, School of Nursing, University of Pittsburgh, Pittsburgh, Pennsylvania
Preface

Initiating and sustaining healthy lifestyle behaviors and adhering to prescribed therapies are key to optimal health. There is growing awareness of the importance of multiple health behaviors and their impact on health, longevity, and quality of life: getting regular physical activity, eating a healthy diet, not smoking, limiting alcohol consumption, getting sufficient sleep, and engaging in preventive health activities, such as injury prevention and limiting sun exposure. Indeed, people who engage in more of these healthy behaviors have significantly lower disease burden and mortality from cancer, cardiovascular disease, and other causes and have more years in good health (“disability-adjusted life years”) than people who do not (Byrne et al., 2016; Ford, Bergmann, Boeing, Li, & Capewell, 2012; Kabat, Matthews, Kamensky, Hollenbeck, & Rohan, 2015; May et al., 2015). Unfortunately, over a quarter of the adult U.S. population in 2014 had two or more chronic conditions affected by these health behaviors, with rates over 60% in adults older than age 65 (Ward & Black, 2016). Moreover, chronic illnesses impacted by health behaviors comprised seven of the top 10 causes of death in 2015, including heart disease, cancer, chronic lower respiratory diseases, stroke, Alzheimer’s disease, diabetes, and kidney disease. Together, these seven chronic illnesses accounted for approximately 87% of all deaths in the United States; unintentional injuries accounted for approximately 8% (National Center for Health Statistics, 2017). Clearly, chronic conditions are of significant public health concern, and attention is needed to increase the adoption and maintenance of health behaviors essential to preventing and managing chronic conditions.

The overarching goal of the Fifth Edition of *The Handbook of Health Behavior Change* is to inform healthcare providers, policy makers, and researchers about the most current theories, challenges, and interventions for supporting health behavior change, including lifestyle behaviors and chronic disease management. *The Handbook of Health Behavior Change* was first published in 1988, and with each edition, there has been growing appreciation for the critical role health behavior plays in maintaining one’s health and well-being. Research has evolved from a primary focus on understanding predictors of engaging in positive health behaviors and the impact of health behaviors on the onset, progression, and exacerbation of diseases to the evaluation of interventions in controlled clinical trials. Now, 30 years later, the themes of the previous editions continue to be relevant. In addition, the Fifth Edition includes new chapters that reflect current practices in the field of health behavior change, including attention to preventive health behaviors and the role of technology in assessing and promoting health behaviors and disseminating interventions to increase accessibility and impact.

**Section I, Chapters 1 and 2**, focuses on the most frequently used theoretical models in health behavior change research. Theoretical frameworks guide the development of strategies and interventions for behavior change and inform health behavior research and...
evaluation. Theory helps identify mechanisms of change in interventions, informing the choice of behavior change strategies toward targets and behaviors that will have the greatest impact on health outcomes. To compare and contrast the commonalities and unique aspects of health behavior change theories, the Fifth Edition reviews theories based on the level at which they operate: those at the level of the individual person, those that take place across multiple levels and in the community, and those that focus on implementation science within larger health systems.

Section II, Chapters 3 through 5, provides updated reviews of factors that serve as obstacles to or that facilitate lifestyle change and disease management behaviors. The authors in this section consider individual characteristics and psychosocial factors, as well as family, community, and broader socio-cultural contexts. Unique developmental considerations for understanding and supporting behavior change among children, adolescents, emerging adults, and the elderly are presented. In addition, the interrelationships among culture, health disparities, and health behavior change and the need to take these into account when designing health behavior change programs and policies are addressed in the context of the growing cultural diversity in the United States.

Lifestyle changes for the health behaviors with the most robust associations with health outcomes are the topics of Chapters 6 through 12 in Section III. These include dietary behaviors, physical activity, tobacco, alcohol, stress, and of course, the challenge of tackling multiple health risk behaviors. New to the Fifth Edition is a chapter on sun protection, which reviews risk factors and contributors to sun exposure/tanning, as well as individual and community-based strategies to promote sun protection behaviors and reduce skin cancer and melanoma. This section provides updated reviews of the challenges in changing and maintaining these health behaviors, as well as the evidence-based intervention strategies found to support health behavior change.

Section IV, Chapters 13 through 18, addresses the challenges of engaging in disease management behaviors for chronic health conditions with lifelong medical regimens. The chapters focus on many of the most prevalent chronic illnesses that contribute to avoidable mortality, including cardiovascular disease, diabetes, respiratory diseases (specifically asthma and chronic obstructive pulmonary disease [COPD]), infectious diseases (including HIV, other sexually transmitted diseases, and tuberculosis), cancer, and obesity. These chapters highlight the many barriers to engagement in self-management behaviors and review the efficacy of interventions to support and improve health behavior change and adherence to medical regimens.

Section V, Chapters 19 through 23, focuses on the development and evaluation of behavior change interventions implemented across different systems and contexts, including interventions to enhance health behaviors within school systems and work settings, health care system-based interventions, and intervention delivery at the level of the built environment. New to this edition, Chapter 19 reviews the theoretical foundations for health behavior change interventions at the family level, including family interventions in both pediatric and adult health populations. This section’s focus on systems and the environments in which behavior change interventions take place illustrates the growing recognition that interventions must be developed and evaluated in the contexts in which health behaviors occur and in which interventions will ultimately be disseminated.

In Section VI, Chapter 24 introduces the foundations of measuring health behaviors and provides an updated review of validated approaches to measuring common health behaviors, including eating, physical activity, medication adherence, and new to the Fifth Edition: sleep. Chapter 25, also new to the Fifth Edition, focuses on the role of technology in behavior change. While technological innovations are integrated throughout the handbook, this chapter delves into the current state of technological innovations in health
behavior change, including the use of eHealth, mHealth, electronic health records, patient portals, and Internet-based strategies for measuring, evaluating, and promoting health behaviors.

Across the range of health behaviors, health conditions, systems, and populations discussed throughout The Handbook of Health Behavior Change, several cross-cutting themes can inform clinical practice, guide future research directions, and influence health policy. First, interventions need to be developed and evaluated in the context of robust theoretical models in order to understand the most potent mechanisms of change and translate the findings to other settings, populations, and health behaviors. Second, new and updated theories, interventions, and research methodologies are needed to tackle the complexity of addressing multiple health behaviors, including those for the treatment of comorbid health conditions, concurrently. Given growing rates of multiple chronic conditions and the public health need for the general population to engage in preventive health behaviors, the reality is that people rarely need to change only one health behavior, and the barriers to lasting behavior change are often complex and multifaceted. Third, given profound racial and economic health disparities in the United States and worldwide, there is a pressing need for culturally informed and tailored behavior change interventions and for effective strategies to reduce barriers by improving access to resources such as healthcare, nutritious foods, and recreational facilities, and decreasing disproportionate exposure to risk factors for illnesses. Fourth, this edition of the handbook emphasizes the rapid pace of innovations in technology in relation to all aspects of studying and implementing health behavior change interventions. As mobile technologies and electronic transmission of health data become increasingly ubiquitous, their roles in health behavior change research and practice will continue to expand, requiring refined methods of study and intervention delivery. Finally, in addition to specific chapters targeting dissemination of interventions to community and care settings, many chapters note the importance of effectively developing and delivering interventions to target populations in the contexts of their everyday life activities.

In total, the Fifth Edition of The Handbook of Health Behavior Change provides an updated and thorough examination of the factors that influence people’s ability to change behaviors to enhance their health and the intrapersonal, interpersonal, sociocultural, environmental, systems, and policy factors that can both positively and negatively affect one’s ability to achieve health behavior goals. Beyond understanding predictors, the handbook provides comprehensive reviews of the empirical evidence for novel and well-supported intervention approaches and offers recommendations for next steps in research to continue to move the field forward. This handbook is designed to be particularly valuable to students at the graduate and advanced undergraduate level in the fields of public or population health, health communications, medical sociology and anthropology, preventive medicine, and health psychology. The content of the handbook also will be informative to clinical investigators, behavioral and social scientists, and healthcare practitioners who grapple with the challenges of supporting individuals, families, and systems in their efforts to facilitate and execute complex health behavior change.

Marisa E. Hilliard, PhD
Kristin A. Riekert, PhD
Judith K. Ockene, PhD, MEd, MA
Lori Pbert, PhD
REFERENCES


The Handbook of Health Behavior Change
Share
The Handbook of Health Behavior Change, Fifth Edition
Modern population health is conceptualized as three major periods best defined by the conflicts and challenges at their boundaries (Susser & Susser, 1996). The era of “sanitary statistics” dates back to the early 19th century when “miasma” was the prevailing paradigm used to describe the cause and spread of disease. Most physicians and public officials believed diseases were caused by foul emanations from “air, water, and places.” This era left its mark in the lexicon with words like “malaria,” which means bad (mal) air (aria) (Young, 2004).
In the latter part of the 19th century, “contagionists” challenged the concept of miasma. The contagionists believed that diseases were caused by organisms passed from individual to individual. The French Chemist Louis Pasteur (1822–1895) proposed a “germ theory” of disease, suggesting that microorganisms are the cause of disease (Karamanou, Panayiotakopoulos, Tsoucalas, Kousoulis, & Androutsos, 2012). The contagionists eventually prevailed, as careful experimentation and observation identified more and more bacteria (germs) that apparently caused tuberculosis, diphtheria, cholera, and other diseases previously believed to be linked to the worst miasmas (Karamanou et al., 2012). In 1876, the German scientist Robert Koch (1843–1910) demonstrated the procedures for linking a specific microbe to a specific disease by identifying the cause of anthrax, and in 1884, Koch and Frederick Loeffler (1852–1915) established criteria for confirming a relationship between a causative microbe and a disease (Karamanou et al., 2012). This approach, known as “Koch’s postulates,” remains the gold standard for confirming the causative agents of most infectious diseases.

Thus, the “germ theory” and the modern concept of disease transmission emerged as the second era of public health during the late 19th and first half of the 20th century (Bullough & Rosen, 1992). The germ theory led to a number of advances, including the development of vaccines and antibiotics (Young, 2004). Due to these advances, death rates from infectious diseases fell substantially in the United States, and the overall life expectancy increased by the middle of the 20th century. For example, in 1900, the average life expectancy at birth was 46 years for men and 48 years for women, but by 1950, it had increased to 66 and 71 years, respectively (National Center for Health Statistics, 2006).

By the second half of the 20th century, disease patterns in more developed countries were increasingly characterized by chronic, noninfectious diseases, which made the germ theory less relevant to population health research and harkened the beginning of a third period: the era of chronic disease epidemiology (Susser & Susser, 1996). To date, this era has focused on using advances in epidemiology and biostatistics to identify, understand, and address risk factors for chronic diseases.

Currently, heart disease, cancer, and stroke are the leading causes of death in the United States, accounting for more than two-thirds of all deaths (Brownson & Bright, 2004; National Center for Health Statistics, 2016). The shift to these and other chronic diseases as the major causes of premature morbidity and mortality contributed to the need to re-conceptualize the most effective strategies in preventive health. Chronic diseases, in contrast to infectious diseases, are not contagious in origin, usually include a long rather than an acute period of illness, are characterized by a prolonged latency period between exposure to the risk factors and adverse health outcome, and more often than not, are precipitated by the confluence of multiple risk factors (Curry & Fitzgibbon, 2009). Ample evidence indicates that the leading causes of premature morbidity and mortality, heart disease, cancer, and stroke can be prevented or at least delayed through behavior change (e.g., lifestyle changes; McGinnis & Foege, 1993). Therefore, adherence to certain preventive health behaviors (e.g., consuming a healthful diet and engaging in regular physical activity) is key to promoting health and prolonging life.
Early attempts to understand and influence the prevention, development, and/or maintenance of chronic disease included the development of several models of individual behavior change (e.g., the Health Belief Model [Rosenstock, 1974], the Theory of Planned Behavior [Ajzen & Fishbein, 1980], and the Transtheoretical Model [Prochaska & DiClemente, 1983] that emphasize changes in behavior and cognition to enhance health (see Chapter 1 for discussion of these models). The majority of health promotion interventions based on these models focus on the individual as the unit of change by attempting to modify an individual’s behavior (e.g., diet and exercise behaviors), but do not focus on the complexity of factors that influence these behaviors (Huang & Glass, 2008). The individual approach to behavior change, which usually targets those at increased risk, has had limited impact as it neglects these complex influences (Maziak, Ward, & Stockton, 2008). In addition, little attention has been given to the communities in which people live and how these environments affect behavior (Cashman & Forlano, 2009). For example, increased physical activity is influenced by the presence or absence of playground equipment and similar resources that promote physical activity (Jago & Bailey, 2001), and dietary intake can be influenced by the availability of larger supermarkets that stock fresher produce at lower prices (Morland, Wing, Diez Roux, & Poole, 2002).

To date, we have seen that rigorously designed and theoretically informed behavior change interventions often provide only modest changes in health behavior that have not consistently translated into lasting behavior change or had a population-level impact (Glasgow, Klesges, Dzewaltowski, Bull, & Estabrooks, 2004). A criticism of some of these interventions (e.g., the Multiple Risk Factor Intervention Trial [MRFIT; Multiple risk factor intervention trial: Risk factor changes and mortality results, 1982; Stamler & Neaton, 2008], the Enhancing Recovery in Coronary Heart Disease trial [ENRICH; Berkman et al., 2003]) is that they are not tailored to address the contexts that influence behavior (Glass, 2000; McKinlay & Marceau, 2000; Relman & Angell, 2002).

The primary purpose of this chapter is to provide an overview of several models that consider multiple factors involved in influencing, initiating, and maintaining behaviors. Specifically, we describe socio-ecological models, community-based participatory research, and social marketing. We also provide an overview of RE-AIM (Reach, Effectiveness, Adoption, Implementation, Maintenance), an evaluation framework designed to assist researchers and practitioners in translating multilevel research into action (Glasgow, Vogt, & Boles, 1999). Finally, we more broadly discuss the role of government, social norms, and the need for policy intervention research, as it relates to health promotion and sustained behavior change. In an effort to place this chapter into a more applied context, we incorporate the current public health crisis of obesity as an example to highlight the role of multilevel models.

**Socio-Ecological Models**

The word “ecology,” which has its origins in the biological sciences, is concerned with the interrelations between organisms and their environment (Bronfenbrenner, 1992). Many other disciplines, such as psychology, sociology, and public health, have adapted ecological models to define frameworks for how people interact with their physical, social, and cultural environments (Stokols, 1992). Within the realm of health behavior research, socio-ecological models provide a framework for the development of multilevel interventions that can systematically address mechanisms of change at various levels of an individual’s environment (Sallis, Owen, & Fisher, 2008). Socio-ecological frameworks can be viewed, in part, as a reaction to the limited explanatory power of
earlier behavioral and cognitive models of behavior change (Stokols, 1992) that primarily focused on the individual as the unit of analysis and did not produce a profound or sustained change in behavior when targeted in interventions (Glanz, Rimer, & Lewis, 2002). The innovation of the socio-ecological models is their consideration of both internal and external influences on health and behavior that range from biological to global levels, as well as the interaction among these factors (Moore, de Silva-Sanigorski, & Moore, 2013).

**CHARACTERISTICS OF SOCIO-ECOLOGICAL MODELS**

Socio-ecological models are based on several core assumptions (Schneider & Stokols, 2008; Stokols, 1992). The first underscores the importance of acknowledging multiple factors that influence behavior at the biological, individual, interpersonal, community, environmental, policy, and global levels (Committee on Capitalizing on Social Science and Behavioral Research to Improve the Public’s Health-Division of Health Promotion and Disease Prevention, 2000; Sallis & Owen, 1997; Stokols, 1992). This is demonstrated in the emerging conceptualization of weight management and the current obesity epidemic (Huang & Glass, 2008). Historically, managing obesity was viewed as an individual’s personal responsibility (Sikorski et al., 2011). However, the minimal weight loss (Dombrowski, Knittle, Avenell, Araujo-Soares, & Sniehotta, 2014) observed in both clinical interventions and well-designed trials (Brownell, 2010) suggests that obesity is better studied in a broader context. Researchers and clinicians increasingly recognize that solutions to the obesity epidemic must come from addressing the problem on multiple levels by considering the complex interactions of biology and socio-environmental changes that coalesce to promote and/or produce excessive weight gain in both adults and children (Egger & Dixon, 2014).

The second core assumption addresses the importance of understanding the complex nature of human environments (Stokols, 1992). For example, descriptions of environments are not limited to their objective (actual) physical and social attributes, but can also be extended to their subjective (perceived) qualities (Schneider & Stokols, 2008). In addition, independent components of an environment (e.g., lighting, temperature, or spatial attributes) can be combined into composite relationships (Stokols, 1987).

The third assumption is that, similar to the way environments can be described in terms of their complexity, participants in those environments can also be studied at a number of levels, ranging from the individual to small groups to larger organizations to populations (Stokols, 1992). The emphasis in this assumption is that, rather than focusing exclusively on the individual or the population, socio-ecological perspectives recognize that coordinated efforts and methodologies are necessary. Again, using the obesity epidemic as an example, some of the changes needed to reverse the epidemic include individual-level behavior lifestyle changes; changes that help schools and workplace environments foster healthy choices; and changes in food advertising, transportation, and urban planning (Gortmaker et al., 2011).

The fourth assumption focuses on the fact that there are elements of any individual’s environment that can either facilitate or impede healthful behavior (Stokols, 1992). In other words, an individual’s ability to independently make good choices can be influenced more or less by the social and environmental contexts in which they live and work (Schneider & Stokols, 2008). As this assumption relates to obesity, most humans gain weight when their environment offers increased opportunities to consume high-fat, high-sugar choices (Johnson, 2013). As an example, Pima Indians in their native Mexico live an agrarian lifestyle, eating indigenous food, and being highly active (Schulz et al., 2006). Most are of normal weight, and chronic diseases are rare. However, a related group of Pimas living
in Arizona suffer from extremely high rates of obesity and have the highest rates of dia-
beities in the world (Schulz et al., 2006). Similarly, rates of obesity and chronic diseases are
higher among lower income and underserved populations in the United States, who are
more apt to live in “obesogenic” environments (i.e., environments with readily available
energy-dense foods and limited opportunities for activity (Carroll-Scott et al., 2013). These
examples underscore the profound impact that context can have on the choices individuals
make. Ultimately, although choices must be made at the individual level, the environment
often dictates the choices available (Brownell et al., 2010).

The fifth assumption recognizes that even within a given environmental context, indi-
vidual behavioral responses will vary (Schneider & Stokols, 2008). Understanding individ-
ual responses can help to create more tailored interventions that may be most beneficial to
specific subgroups. For example, recent research on physical activity suggests that certain
genetic variations may be related to a greater predisposition to exercise (Herring, Sailors,
& Bray, 2014). However, familial norms, cultural emphasis on the priority given to being
active, and access to safe locations to exercise will affect activity levels through mechan-
isms that have nothing to do with genetic predisposition (Diez Roux, 2011). Therefore,
socio-ecological models take into account individual-level differences in combination with
contextual factors to identify the most promising strategies for a given subgroup.

Finally, the socio-ecological framework acknowledges the dynamic nature of behavior.
Environments do not remain constant, and behavioral choices must be made and acted on
in the context of a continually changing environment. Thus, flexibility must be built into
any multilevel model of behavior change.

SOCIO-ECOLOGICAL MODELS AND STRATEGIES FOR
OBESITY PREVENTION

With permission, we have reproduced a figure (Huang, Drewnosksi, Kumanyika, & Glass,
2009) that depicts the complex and reciprocal contexts present when addressing obesity
prevention (Figure 2.1). This model depicts biological and socio-environmental influences
on behaviors that affect body weight (e.g., eating and activity behaviors) and illustrates the
importance of multiple levels of influences on health behavior, including those ranging
from genetics to the individual, family, community, and society (Huang & Glass, 2008).
This model also recognizes that several factors act on the individual, including attitudes,
social influences, and cultural norms (DeVries, Glasper, & Detillion, 2003).

While the implementation of this approach can be complex, its essence is that, in
order to make effective changes, individuals must have a supportive environment (Pearl
& Lebowitz, 2014) that both supports healthier lifestyles (Simon et al., 2014) and provides
incentives to make those healthier choices (Ashe, Graff, & Spector, 2011). For example,
many people have much easier access to food options that are high in fat and sugar, rather
than fruits and vegetables, and these options are typically more affordable and require
little to no preparation (Huang et al., 2009). This environment is not supportive of healthy
dietary habits. Similarly, many neighborhoods and communities do not have safe, aes-
thetically pleasing facilities or built environments that support physically active lifestyles
(Aboelata & Navarro, 2010).

Although this multilevel understanding of the development and prevention of obesity
and other chronic diseases is useful in both theory, and practice, its adoption has been
slow. Awareness and use of multilevel models in addressing obesity and other chronic
diseases has begun to erode the long-held beliefs that education is the only element neces-
sary to make the right choices and that failure to make the “right” choices is a failure to
take personal responsibility (Brownell et al., 2010). Socio-ecological models do not obviate the role of education in promoting healthful changes, but instead underscore the need for creating an environment that makes the healthier choices feasible.

Figure 2.1. Societal policies and processes with direct and indirect influences on the prevalence of obesity and undernutrition. Vertical and horizontal links will vary across different societies and populations.


Community-based participatory research (CBPR) is a collaborative research approach that uses an ecological framework to explore and address the broader context of health within a given environment (Israel, Schulz, Parker, & Becker, 1998) while enlisting the participation of the communities affected by the issue being studied. Ideally, CBPR promotes shared decisionmaking and shared ownership of outcomes by including representatives from community and academic organizations in all aspects of the research project (Viswanathan et al., 2004). The approach emphasizes equal involvement in an effort to create a project that truly reflects the needs of the specific community, rather than what academics and other researchers may think they need (Cornwall & Jewkes, 1995).

The complex multilevel factors present in communities most impacted by health inequities can make any attempts to translate science into practice in these settings particularly challenging (Wallerstein & Duran, 2010a). In the past few decades, CBPR has gained...
recognition as an often-effective approach for addressing persistent public health disparities (Wallerstein & Duran, 2010b). As characterized by Israel and colleagues, the main aim of CBPR is “to increase knowledge and understanding of a given phenomenon and integrate the knowledge gained into interventions, policy change, and social change to improve the health and quality of life of community members” (Israel et al., 1998). This alternative research paradigm may better equip researchers to uncover and address contextual factors contributing to health disparities.

The National Institutes of Health (NIH) Office of Behavioral and Social Sciences Research (OBSSR) describes CBPR as an applied collaborative approach that enables community residents to more actively participate in the full spectrum of research (from conception – design – conduct – analysis – interpretation – conclusions – communication of results) with a goal of influencing change in community health, systems, programs or policies. (NIH OBSSR, n.d.)

Whereas conventional research assumes the academic researcher is in the best position to set the research agenda for a given community (Green & Mercer, 2001), CBPR unites researchers, community members, and relevant stakeholders to actively participate in the research process (Green & Mercer, 2001; Minkler, 2010). The partnerships formed in CBPR are dynamic, and no one set of principles is applicable to all research that includes CBPR. However, Israel and colleagues reviewed the CBPR literature and identified nine principles that serve as guides for researchers interested in using CBPR (Israel & Schulz, 2012). Of these, one of the more important principles is that the community is viewed as a unit of identity. For instance, community can be defined by geography (e.g., neighborhood, city, town) or may refer to groups with a common identity (e.g., race/ethnicity, shared values, interests, culture, goals) independent of geographic location (Israel & Schulz, 2012; Steuart, 1993). Further, compared with traditional research, scientists, or academicians who use CBPR, no longer hold all the power. Instead, power is shared with the community involved in the research by using strengths/resources of the community; forming equitable academic/community partnerships; fostering an exchange of skills, knowledge, and capacity building for all partners involved; using the research to benefit the community; addressing relevant concerns as identified by the community; disseminating findings to all relevant partners (e.g., community and relevant stakeholders); and making a commitment to sustainable solutions (Israel & Schulz, 2012).

A 2004 Agency for Health Research and Quality (AHRQ) report identified seven key benefits of CBPR for communities and six key benefits for researchers (Viswanathan et al., 2004). Potential benefits to the community include (a) more efficient use of existing resources, (b) better matching of research efforts to problems of interest to the community, (c) dignified approach to involving community members in the research process, (d) measures and methods are less likely to confuse members of the target community, (e) increasing trust and bridging cultural gaps between academic/community partners, (f) findings are a more accurate reflection of the community, and (g) community members take pride.
in their accomplishment and occasionally benefit from research-related career advancement. Potential benefits to researchers include (a) better probability of completing the research project, (b) greater likelihood of future funding if community participation yields better outcomes, (c) improved recruitment and retention due to community involvement, (d) improvements in data collected, (e) interventions/projects are more culturally sensitive, and (f) findings more accurately reflect the community.

While CBPR has many benefits, the approach is challenging (Mason et al., 2013). Minkler (2004) identified five ethical challenges (Banks et al., 2013) researchers should consider when conducting CBPR: (a) achieving a true “community-driven” agenda; (b) insider-outsider tensions; (c) real and perceived racism; (d) the limitations of “participation;” and (e) issues involving the sharing, ownership, and use of findings for action. CBPR also has several potential methodological limitations of concern, including possible threats to external validity and scientific rigor (Wallerstein & Duran, 2010a) and the potential for a lack of focus in achieving “intended” outcomes (Viswanathan et al., 2004).

Despite its challenges, CBPR continues to gain prominence in public health research due to its overwhelming value to both communities and researchers (Wallerstein & Duran, 2010b). For example, the Centers for Disease Control (CDC) established the Prevention Research Centers Program in more than 30 schools of public health or medicine to support the use of CBPR through collaborations of academic institutions and community partners in conducting research in underserved communities. In 2002, the Institute of Medicine (IOM) identified CBPR as one of the eight essential content areas for emerging public health professionals (IOM, 2002). Since that time, more than a dozen institutes at the NIH have released funding opportunity announcements dedicated to CBPR (NIH OBSSR, n.d.). Along with these initiatives, experts in CBPR have developed guidelines and further refined methods to support this research approach (Israel & Schulz, 2012; Minkler, 2010) in an effort to better implement and evaluate the impact of CBPR.

CBPR provides context for understanding the effects of community on behavior change (Chen, Diaz, Lucas, & Rosenthal, 2010) and may provide a foundation for developing more effective programs and interventions due to its inclusive approach and the recognition of the environmental factors that affect health. Using the obesity epidemic as an example, CBPR recognizes that influential members of a community may be much more effective agents of change than outsiders who may not have intimate knowledge of key cultural and social entities within the community that affect eating and activity patterns (Salimi et al., 2012).

CBPR EXAMPLE: OBESITY PREVENTION

Shape Up Somerville, one of the first CBPR initiatives aimed at preventing childhood obesity, tested the effectiveness of an environmental change intervention on children’s weight (specifically body mass index, BMI) (Economos et al., 2007). This nonrandomized controlled trial was conducted in three culturally diverse communities in Somerville, Massachusetts, with two control communities matched on socio-demographic characteristics. More than one-third of the elementary school children in Somerville were either at risk for or were overweight. Researchers from Tufts University and community partners from Somerville (i.e., parents, teachers, children, school employees, and policy makers) collaborated in all stages of the research from conception through dissemination. The group determined that one of the objectives of the intervention would be to address every facet of an elementary school child’s day. Accordingly, the intervention design included components that influenced environments in the home, school, and community while covering activities occurring before, during, and after school. The intervention had a modest but significant effect on BMI z-score. The change in BMI z-score equated to an almost one-pound reduction over
the course of eight months for an 8-year-old child. Almost 10 years after the initial study, Shape Up Somerville continues to thrive through the support of the city government and coordination by the health department and other key stakeholders.

### SOCIAL MARKETING

The socio-ecological perspective maintains that individual-level behavior both impacts and is impacted by multiple levels of influence: intrapersonal, interpersonal, community, institutional, and public policy (Robinson, 2008). As each level of influence has the potential to affect health behavior, conventional approaches that focus solely on intrapersonal factors (e.g., knowledge, beliefs, perceptions) may limit long-term behavior change. Social marketing has been recognized as an approach that targets multiple levels of influence (e.g., social norms, barriers, policy) to affect individual-level behavior change (Grier & Bryant, 2005). The best known social marketing approaches have been national campaigns addressing tobacco use (Farrelly et al., 2002), physical activity (Wong et al., 2004), and nutrition (Foerster et al., 1995).

One widely cited definition of social marketing is “the application of commercial marketing technologies to the analysis, planning, execution, and evaluation of programs designed to influence voluntary behavior of target audiences in order to improve their personal welfare and that of society” (Andreasen, 1995). As highlighted in this definition, social marketing differs from commercial marketing by its focus on influencing behavior as a means to improve the welfare of both the individual and society. While commercial marketing places a higher priority on the benefit (e.g., financial) of the organization, social marketing shifts this focus onto the target audience.

Marketing mix is a key marketing principle commonly used to guide the development of social marketing campaigns/programs. This principle is most commonly known as the “four Ps”: product, price, place, and promotion. We provide examples of the four Ps based on the CDC VERB campaign, a national mass media campaign promoting physical activity to children aged 9 to 13 (“tweens”; Wong et al., 2004).

In the context of social marketing, “product” refers to the desired behavioral outcome and related benefits. Defining the product of an intervention often requires formative research that gathers information on the current behaviors, perceptions, barriers, and attitudes of the target group to identify the benefits most salient to the target audience. In the VERB campaign, the product was promoting physical activity in “tweens” (target audience), and the related benefits included having fun and spending time with friends.

“Price” refers to the cost or barriers (e.g., financial, psychological, social) that the target audience perceives to be associated with adopting the desired behavior. In commercial marketing, consumers are more prone to make a purchase if the benefits outweigh the costs. Similarly, one of the objectives of social marketing is to convince the target audience that the perceived cost–benefit ratio favors the desired behavior. In VERB, examples of “price” or barriers included time constraints, lack of access for places to play, aversion to team sports, fear of embarrassment, and other competing interests (e.g., television, Internet, gaming) (Asbury, Wong, Price, & Nolin, 2008). To counter these barriers, the VERB brand portrayed physical activity as fun, rather than competitive, accessible to all children, regardless of ability, and easy and appealing (Asbury et al., 2008).

“Place” is where the target audience accesses the “product” (e.g., receives information about it) or performs the behavior. The VERB campaign characterized “place” as any safe location for physical activity (Wong et al., 2004).

“Promotion” represents the message content, materials, and all channels or activities used to communicate the product to the target audience. Messages can be delivered
through print materials, media, advertising, and other means. However, it is important to consider the target audience in selecting both the promotional messages and the form and means of delivery. In VERB, the core content revolved around three themes: (a) physical activity is fun, (b) physical activity is an opportunity to explore and discover, and (c) physical activity is an opportunity to spend time with friends. CDC partnered with advertising and public relation agencies to develop a promotional campaign around these themes that included advertisements on television, radio (e.g., public service announcements), Internet, and billboards, as well as distributing promotional items with the VERB logo (e.g., bracelets, tattoos, sports equipment) (Andreasen, 1995). The effectiveness of the product, price, place, and promotion was examined in a 2002 to 2006 evaluation of the VERB campaign on children’s physical activity. The results showed that children’s awareness of the campaign remained consistent over the years that the mass media campaign was promoted. Additionally, increased exposure to VERB was positively associated with children’s perception of the benefits of being physically active, their self-efficacy to be physically active, social influences on physical activity, and past-day self-reported physical activity (Huhman et al., 2010). However, no objective data on physical activity were collected.

Another distinct feature of social marketing is the use of audience segmentation. Audience segmentation is a process that identifies subgroups of a larger audience that shares common characteristics. These subgroups are commonly based on demographic factors (e.g., race/ethnicity, age, or income), but a greater level of refinement is also possible with segmentation. In the context of health promotion, commonalities may be based on traits related to target behavior, risk level, or readiness to change (Forthofer & Bryant, 2000). Segmentation allows for a greater understanding of the audience, which in turn allows for a more tailored intervention approach. As VERB was a national campaign intended to reach children across race/ethnicity, tailored strategies were developed for audience segments of specific minority ethnic groups (i.e., African American, Asian, Hispanic/Latino, and American Indian) (Huhman et al., 2008).

**A NEED FOR TRANSLATION OF EVIDENCE-BASED INTERVENTIONS**

Multilevel socio-ecological models and community participation provide useful frameworks for addressing public health issues, such as obesity. However, much remains to be understood regarding the determinants and processes of actual population-level behavior change (Merzel & D’Afflitti, 2003). Given the complexity of these models, which take into account individual-, social-, environmental-, community-, and policy-level interactions, there is a need for an improved understanding of the precise way in which these interventions are operationalized, translated, and sustained in the public health domain (Merzel & D’Afflitti, 2003).

Federal and private funders spend billions of dollars each year on community-based health intervention research in the United States (Dreisinger et al., 2008). In an evaluation completed by public health agencies regarding evidence-based public health, 58% of the respondents reported that their health department was using evidence-based research (Dreisinger et al., 2008). However, only a small percentage of this money supports research designed to empirically evaluate the dissemination of evidence-based interventions into clinical and public health practice (Glasgow, Lichtenstein, & Marcus, 2003; Kerner, Rimer, & Emmons, 2005). Despite the best intentions of health promotion researchers, the translation of clinical or community evidence-based health interventions into broader scale
dissemination and adoption is complex and often unsuccessful (Goode, Owen, Reeves, & Eakin, 2012). Unfortunately, this leaves a sizeable gap between the literature on what is possible (i.e., the evidence-based) and what is actually feasible (i.e., actual public health practice; Anderson, 1998). Glasgow et al. (2003) attribute this disconnect to several interrelated factors, including limited time and resources of both clinical and public health practitioners, insufficient staff training, lack of incentives to adopt evidence-based programs into practice, and inadequate infrastructure and organization at the community or systems level to support translation and maintenance of new programs. Notably, Glasgow et al. (2003) also place some responsibility on researchers, suggesting that the logic and assumptions behind the design of behavioral health efficacy and effectiveness trials often impede dissemination efforts.

The research paradigm historically used in community-based health intervention research stems from two influential papers published in the 1980s (i.e., Greenwald & Cullen, 1985; Flay, 1986). Both papers propose a logical progression of research beginning with hypothesis generation and ending with dissemination studies. However, this linear flow relies heavily on success at the “efficacy” and “effectiveness” stages of intervention research (Glasgow et al., 2003). Efficacy studies are designed to show that a given treatment or intervention does more good than harm (Flay, 1986). Typically, these trials are very tightly controlled and delivered in a standardized manner by expertly trained research staff, to a highly selected target audience (Glasgow et al., 2003). This level of rigor allows the researcher to determine whether any positive or negative outcome effects can be attributed to the intervention. On the other hand, an effectiveness trial examines whether the treatment or intervention produces more good than harm when conducted under “real-world” conditions, by modestly trained staff, and with a more representative target audience (Flay, 1986), with the expectation that a trial of this type should produce results that are generalizable (Glasgow et al., 2003). However, the rigor of funding processes and an overemphasis on tightly controlled conditions has left the behavioral intervention research landscape with many relatively small, highly controlled efficacy studies, and few successful effectiveness trials (Glasgow, Bull, Gillette, Klesges, & Dzewaltowski, 2002; Oldenburg, Ffrench, & Sallis, 2000).

Glasgow et al. (2003) suggest that the field has made a flawed assumption in believing that interventions proven to be successful at the efficacy stage are the best candidates for effectiveness trials. The emergence of multilevel models in public health research demonstrates why efficacy trials are poorly suited for identifying promising large-scale approaches. Specifically, at the efficacy stage of research, little emphasis is placed on external or moderating factors, such as appeal to the broader target audience, adaptability to participants and stakeholders (i.e., feasibility), or variations in outcomes depending on setting, or demographic or socio-economic characteristics of the participants. In contrast, effectiveness interventions explicitly address these factors, recognizing that the interplay of complex, multilevel personal and environmental factors provides the context for success or failure (Glasgow et al., 2003). Thus, interventions focused solely on internal factors may be efficacious in a controlled setting, but may not readily translate to the intended target audience in a “real-world” setting (Glasgow et al., 2003). Therefore, it is important that behavioral health intervention researchers evaluate both internal and external factors across the research paradigm so that the scientific knowledge gained can be more effectively translated into broader public health use (Glasgow et al., 2003).

THE RE-AIM APPROACH

Researchers have developed several empirically derived intervention planning and evaluation frameworks to address the gaps between the evidence base and dissemination, as
The reach, efficacy/effectiveness, adoption, implementation, and maintenance (RE-AIM) evaluation framework emphasizes the importance of including and evaluating internal and external program elements, both individual and organizational (setting), along the research trajectory from efficacy through dissemination in an effort to improve the dissemination of evidence-based interventions into public health practice. RE-AIM can be used in the planning and evaluation of systems levels, social, ecological, and community-based public health interventions.

Within the framework, *reach* is an individual-level measure of participation (Glasgow et al., 1999). It represents the percentage of eligible persons in the target population who participate in an intervention and the extent to which those participants represent the target population based on socio-demographic, medical, and psychosocial characteristics (Bopp et al., 2007; Glasgow et al., 1999). If the intervention population is representative of the larger population, one can make a stronger case for generalization of the program into a community or “real-world” setting (Estabrooks, n.d.). Estabrooks (n.d.) and Glasgow et al. (2003) encourage researchers to evaluate *reach* by examining inclusion/exclusion criteria, participation rates, dropout, characteristics of participants compared to nonparticipants, and the use of qualitative methods to understand reach and recruitment specific to the target audience. *Efficacy* or *effectiveness* is an individual-level measure that assesses the extent to which the intervention has a positive effect on the hypothesized outcomes. Common measures in health interventions include biologic (e.g., blood pressure, weight) and behavioral factors (e.g., dietary intake, tobacco use). Including an evaluation of unintended or negative outcomes is essential so that one can determine that harm does not outweigh benefit (Estabrooks, n.d.; Glasgow et al., 1999; Glasgow et al., 2003). Researchers should also use an intent-to-treat or imputation for missing values analysis and examine moderators across subgroups, as well as economic health outcomes (Glasgow et al., 2003). *Adoption* is an organizational or setting-level factor that evaluates the percentage and representativeness of the intended setting adopting the intervention (Estabrooks, n.d.; Glasgow et al., 1999; Glasgow et al., 2003). Organizations opting not to implement a given intervention should also be considered, as this may provide important information regarding barriers to adoption. Adoption is often evaluated through direct observation, surveys, and structured interviews. *Implementation* is an organizational measure that assesses the extent to which a program is delivered as intended (e.g., number of classes taught or number of pamphlets distributed) and the time and costs related to delivery (Estabrooks, n.d.; Glasgow et al., 1999; Glasgow et al., 2003). Consistency of delivery by different intervention agents (i.e., fidelity) should also be evaluated. Evaluating *implementation* is crucial to determining intervention components that may be practical and effective in representative settings. *Maintenance* is an individual- and organizational-level element that assesses the extent to which an individual continues the intended outcome for six or more months (Estabrooks, n.d.; Glasgow et al., 1999; Glasgow et al., 2003). It is also a measure of the sustainability of a program within a given setting. Researchers are encouraged to examine
pushback from participants and use CBPR in the strategic planning efforts in early stages, including the efficacy state of the intervention, to improve maintenance.

**ADDITIONAL IMPLEMENTATION SCIENCE MODELS AND APPROACHES**

It is worth noting that, in addition to RE-AIM, there are approximately 60 implementation science models that have been developed to inform research designs that have dissemination in mind from inception (e.g., diffusion of innovation, health promotion research center framework, OPTIONS model; Tabak, Khoong, Chambers, & Brownson, 2012). Tabak et al. (2012) present these models and provide guidance for researchers in selecting a model that is most relevant in informing designs that improve the dissemination and implementation of their work. Specifically, for each model, they present whether or not it is more informative for dissemination or implementation or both, and which level of the social-ecological model the particular framework pertains to most.

In addition to the number of implementation science models, there are also several research designs used to evaluate and improve the implementation of evidence-based interventions (Brown et al., 2017). Brown and colleagues reviewed some implementation science designs, including within-site, between-site, and within- and between-site comparisons. Within-site designs are appropriate for investigating changes that occur inside of a single system. Post design within-site designs focus on evaluation after an implementation strategy has already been adopted. Post design focus on the delivery of the intervention and not on patient outcomes. Pre-post design is appropriate when some interventions are being adopted, but are not extending to the entire target population. Pre-post designs involve improving the implementation process and then evaluating changes in reach. Between-site designs focus on changes in implementation and dissemination over time across systems or sites. New implementation strategy versus usual practice implementation designs allow for the comparison of implementation or dissemination strategies across settings to determine whether the new strategy is more effective. Head-to-head randomized implementation trial designs allow for the comparison of two different already existing implementation strategies across sites. Factorial designs allow for the comparison of two or more implementation strategies at once to determine which strategy is the most effective. Finally, cross-over designs make within- and between-site comparisons possible in the case that particular sites may adopt one implementation strategy and then switch to another strategy.

**FUTURE DIRECTIONS OF DISSEMINATION AND IMPLEMENTATION SCIENCE RESEARCH**

Although these methodologies and others have been used to increase the dissemination and implementation of evidence-based interventions in a variety of settings, such as community settings, social service settings, healthcare and schools, there is much work still to be done in this area. Brownson, Dreisinger, Colditz, and Proctor (2012) note several future research directions in dissemination and implementation research, including (a) developing a consistent terminology, (b) developing new and improved outcome measures for implementation science, (c) building more evidence to develop “evidence-based” dissemination and implementation models, (d) measuring and reporting the public health impact of dissemination and implementation research, and (e) improving training for growing implementation science researchers.
ENVIRONMENTAL SUPPORT AND THE ROLE OF GOVERNMENT IN OBESITY PREVENTION

Public health interventions have eliminated smallpox and polio (Young, 2004), decreased accidents due to drunk driving (NIH, 2013), increased seat belt safety (National Center for Injury Prevention and Control Division of Unintentional Injury Prevention, 2011), and helped to reduce the prevalence of smoking in the United States (Roeseler & Burns, 2010). Thus, the government clearly has an interest and a role to play in promoting the health of the population (Gearhardt et al., 2012; Novak & Brownell, 2012).

To date, a number of programs and policies have been advanced in an effort to address the obesity epidemic, including nutrition labeling on packaged food (Nutrition Labeling and Education Act of 1990), presentation of caloric information on restaurant menus (Department of Health and Human Services Food and Drug Administration, 2014; Nutrition Labeling of Standard Menu Items at Chain Restaurants [2010]), and increased availability of healthier foods for low-income populations through changes in the Special Supplemental Nutrition Program for Women Infants and Children (WIC) program (Oliveira & Frazao, 2015) and other initiatives (U.S. Department of Agriculture [USDA] Food and Nutrition Service, 2011, 2014). Local, regional, and national obesity campaigns have also been implemented, including the County of Los Angeles Public Health Department’s program, Choose Health LA. This initiative provides a variety of program offerings, such as healthy parenting workshops, partnerships with local restaurants to offer healthier and smaller meal options, and increased quality and accessibility of parks and pedestrian zones (Health, 2017). Choose Health LA also works at the policy level by issuing monthly public education campaigns, ranging in topic from “Healthy Eating Out Tips” to “Physical Activity and Screen Time.” Government programs like Choose Health LA may have a more profound impact by influencing health behaviors and decisions at various levels of the socio-ecological model, starting as small as the individual and moving all the way up to policy change.

Despite recent progress in obesity intervention, individuals’ environments are still structured with extensive barriers to healthy lifestyles, as evidenced by the continued standard of excessively large portion sizes in many restaurants. This “super-size” phenomenon is attributable to a chain of events in the 1960s, when David Wallerstein, a movie theater owner, wanted to increase sales by having his customers purchase more popcorn (Wikipedia, n.d.). He was not successful in getting people to purchase two servings of popcorn, but he found they were willing to purchase one serving at a larger size and slightly higher price. In Mr. Wallerstein’s later position on the board of directors of the McDonald’s Corporation, he convinced the company to offer a large size of fries to boost sales. Although the company’s founder felt that people would buy a second order if they wanted more fries, he agreed to test the approach. The approach worked so well that today’s small order of fries is the size of a large from the late 1970s, and the same is true for other menu choices (Wikipedia, n.d.). Reflecting this trend across a variety of food sources, fast food chains, restaurants, and even grocery stores now offer portion sizes up to 138% of what was offered in the 1970s (Brodwin & Lee, 2016; Nielsen & Popkin, 2003; Piernas & Popkin, 2011).

Research supports the premise that people are susceptible to environmental cues that negatively affect weight management (Wansink & Sobal, 2007). For example, a longitudinal study reported that people who live closer to fast food restaurants consume fast food more often and that children who attend schools that serve more unhealthy foods tend to be heavier than those who attend schools that offer more healthful foods and do not allow vending machines in the school (Boone-Heinonen et al., 2011). Further studies have expanded upon these findings, showing that closer proximity to fast food and full-service
restaurants is predictive of higher BMI z-scores, while closer proximity to supermarkets is associated with lower BMI z-scores (Fiechtner et al., 2015; Grier & Davis, 2013; Singleton, Affuso, & Sen, 2016). Of note, these studies also indicate that people from ethnic minority and low-income backgrounds face the most limited healthy options in their food retail environments, and even when fast food proximity is equal across groups, those populations are still the most adversely affected. In an effort to combat some of these issues within a school setting, the Healthy, Hunger-Free Kids Act (USDA Food and Nutrition Service, 2017) was passed in 2010 to provide more stringent regulation of nutrition standards for all school meal programs, allowing students across the country to obtain access to healthier foods. Access to healthy options outside of the school setting continues to be an issue, but the Healthy, Hunger-Free Kids Act demonstrates movement in a direction toward better management of the food environment as we begin to recognize how different systems shape individual health.

Recognition of the role of multiple levels of influence can be seen perhaps most vividly in the recent push to reduce individual consumption of sugar-sweetened beverages (Han & Powell, 2013). Researchers have noted that the exposure of children to television advertising for sugar-sweetened beverages was significantly reduced from 2003 to 2009 (Powell, Schermbeck, Szczypka, Chaloupka, & Braunschweig, 2011; Terry-McElrath, O’Malley, & Johnston, 2012). Providing even further regulation for youth, in 2014, the National School Lunch Program and School Breakfast Program prohibited the sale of soft drinks and energy drinks for elementary and middle-school students, in addition to limiting high school students to select low-calorie options (USDA Food and Nutrition Service, 2013, 2016, 2017). As of 2014, 34 states and Washington, DC enforced sales tax on soda sold in food stores, with 20 states taxing at a rate higher than the general state sales tax and 30 states enforcing an even higher tax for vending machine drinks. In March 2015, Berkeley, California, implemented the first city-level tax on sugar-sweetened beverages in the United States at a rate of one cent per ounce, and by 2017, several regions nationwide followed suit, including Philadelphia, Pennsylvania; Boulder, Colorado; Cook County, Illinois; and three more cities in the San Francisco Bay Area. The preliminary results from the Berkeley tax show that four months after implementation, sugar-sweetened beverage consumption decreased by 21% (compared to a 4% increase in comparison cities) and water consumption spiked by 63% (compared to a 19% increase) in low-income neighborhoods (Falbe et al., 2016). Due to a growing recognition of the need for multilevel involvement to achieve healthy lifestyle changes, individuals, communities, and policy makers have been able to lower access to sugar-sweetened beverages and effectively alter consumption levels. Although much remains to be done, these efforts demonstrate a positive step toward sustained health promotion.

THE ENVIRONMENT, SOCIAL NORMS, AND BEHAVIOR CHANGE

Socio-ecological frameworks, community-based participatory research, and social marketing have emerged as models in the context of obesity prevention, demonstrating the importance of social and environmental factors within the broader context of health and disease. Looking at the history of tobacco control as an example, attempts to reign in tobacco use show the value of these broader approaches to public health and underscore the need for interventions that move beyond education to include multiple levels of change (Roeseler & Burns, 2010). Just as with tobacco control efforts, this requires embracing the call for supportive environments and an altered perception of what is considered normative behavior to result in populationwide shifts in dietary and activity behaviors related to obesity. However, the recognition that changes in social norms requires time is essential...
(Roeseler & Burns, 2010; Zhang, Cowling, & Tang, 2010). For example, cigar and pipe smoking were banned on U.S. aircrafts in 1979, but it was not until 1998 that all smoking was banned on U.S. domestic flights and two more years until smoking was banned on all flights by U.S. airlines (Federal Register, 2000).

Further complicating the models of obesity prevention and intervention, the issue of obesity requires not only behavior reduction, as in the case of tobacco use, but also behavior promotion of healthy diet choices and physical activity. This complication offers further demonstration of the need for addressing behavioral health change at multiple levels and in multiple ways, such as pairing restrictions on unhealthy food choices with increased availability of healthy alternatives. Fortunately, campaigns against obesity have an advantage over the tobacco control campaigns of the past, as recent technological innovations have made health information and healthful foods more accessible, through tools such as mobile applications that offer services ranging from exercise routines to delivery of fresh and nutritious meals. Additionally, activity trackers, such as the Fitbit, allow users to better monitor their own behaviors, set goals, and share their progress with their peers, providing another promising option for shifting social norms toward healthier lifestyles. Promotion of behavior change requires a long-term commitment to restructuring social and environmental factors, but with the availability of multiple methods for addressing this change, norms for healthier lifestyles are becoming within reach.

**EMERGING AREAS FOR FUTURE RESEARCH IN PUBLIC HEALTH**

Innovative research strategies and eHealth interventions are two areas of research that may inform more rapid implementation and dissemination of evidence-based public health interventions and are described briefly next (Buscemi et al., 2017).

**INNOVATIVE RESEARCH STRATEGIES**

There has been a growing interest in the use of optimization strategies in public health research that allow for more rapid translation of research to practice. The multiphase optimization strategy (MOST) is a framework formed by engineering strategies to design more efficient interventions (Collins, Murphy, & Strecher, 2007). The MOST framework can be used to determine which components of bundled, multicomponent interventions are “active” and which are not. Within the MOST framework, the sequential multiple assignment randomized trial aims is to optimize the development of adaptive interventions (Collins, Nahum-Shani, & Almirall, 2014). These trials aim to determine how individuals respond to certain intervention components (e.g., timing, dose, order of intervention delivery) through one or more randomizations. Such research method frameworks can be considered to answer specific questions that may inform the dissemination and/or implementation of public health interventions.

The MOST approach is currently being applied to determine which evidence-based obesity treatment intervention components are the most potent in intervention adherence and weight loss. Typical weight loss interventions deliver “bundled” treatment components, making it difficult to determine which are the most “active” and which are not—potentially limited effectiveness and scalability of evidence-based interventions. The Opt-IN study (Pellegrini, Hoffman, Collins, & Spring, 2014, 2015) is simultaneously testing the efficacy of five evidence-based components of an intensive behavioral lifestyle intervention (e.g., phone coaching, letter from primary care physician, text message support,
meal replacements, and social support (buddy training)). Across participants, some of these components are turned “on” or “off,” and the MOST approach will allow comparisons of these components independently and in combination.

**eHEALTH INTERVENTIONS**

EHealth interventions (e.g., interventions delivered via web or mobile device) may have the ability to reduce participant burden while increasing the reach of evidence-based interventions. In the case of obesity, in-person gold standard weight loss and maintenance interventions typically result in 10% weight loss. However, there are limitations to these interventions; they are extremely intensive, expensive, and are difficult for many individuals to access. EHealth interventions provide a potential solution, given that it is possible to deliver the evidence-based weight loss intervention components via technology. Kozak et al. (2017) recently provided an updated review of randomized controlled trial evidence for technology-based weight management interventions. They found that, for the most part, web-based, text-messaging, and mobile-device interventions tended to deliver similar evidence-based components (e.g., self-monitoring, feedback, goal setting, supportive accountability). In terms of web-based interventions, more recent interventions are more interactive and less psychoeducational than initial web-based interventions. The success of weight loss from a web-based intervention is dependent upon how much the individual uses the site and how adherent he or she is to the intervention. Many web-based studies involve a phone coaching component, making it difficult to determine how much of weight loss success is attributed to the website itself or phone coaching. However, overall, weight losses fall in the 7% to 10% range. Text-messaging interventions have some promising findings for weight loss; however, text-messaging interventions differ widely in terms of purpose of the texts, frequency of contact. In terms of mobile applications, many applications include evidence-based intervention components, but findings are currently equivocal for weight loss. Evidence is still growing in the area of social media interventions and wearable sensors for weight loss, but there is some emerging support of efficacy of interventions delivered via these methods.

Despite the proliferation of findings from studies testing eHealth intervention methods in public health, overall, empirical support is still limited (Tomlinson, Rotheram-Borus, Swartz, & Tsai, 2013). More research is also needed to determine the generalizability and cost effectiveness of eHealth interventions (Bennett & Glasgow, 2009). One limitation to eHealth research is that technology innovation moves more quickly than the research that sets out to test its efficacy. Glasgow, Phillips, and Sanchez (2014) review how implementation science methods and research designs described previously in this chapter can be used to address this issue. Namely, there are implementation science approaches that can be utilized during each stage of research, involving eHealth interventions that can improve research in this area. Examples include: (a) involving stakeholders at each stage of the research process, (b) using adaptive and pragmatic designs, (c) reporting results transparently, and (d) applying for funding that has a more rapid review process. Although eHealth interventions are promising, continued and improved research in this area will further elucidate their effectiveness.
CONCLUSION

No single solution exists for significant public health problems such as obesity. Thus, multifactorial approaches are our best hope for solving this type of challenge (Let’s MOVE!, 2010). Ultimately, individuals must take responsibility for both healthful and unhealthful choices, whether they are decisions about seat belts, driving under the influence of drugs or alcohol, food consumption, or physical inactivity. However, for obesity and other chronic diseases to be reversed on a population level, there must be dramatic shifts that make it easier for individuals to choose lifestyle behaviors aligned with healthful, active living. Unraveling the multiple contexts that have contributed to making healthful choices challenging requires a comprehensive and coordinated effort on a number of levels by individuals, communities, researchers, policy makers, and government agencies (Graff, Kappagoda, Wooten, McGowan, & Ashe, 2012).

REFERENCES

- the-staple-city-breakfast-1


Johnson, R. K. (2013). Children gain less weight and accumulate less fat when sugar-free, non-caloric beverages are substituted for sugar-sweetened beverages. *Evidence Based Medicine, ebmmed-2012-101137.*


