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Editorial: 3rd Special Issue on behavior change, health, and health disparities

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Abstract

This Special Issue of Preventive Medicine (PM) is the 3rd that we have organized on behavior change, health, and health disparities. This is a topic of critical importance to improving U.S. population health. There is broad scientific consensus that personal behaviors such as cigarette smoking, other substance abuse, and physical inactivity/obesity are among the most important modifiable causes of chronic disease and its adverse impacts on population health. Hence, effectively promoting health-related behavior change needs to be a key component of health care research and policy. There is also broad recognition that while these problems extend throughout the population, they disproportionately impact economically disadvantaged populations and other vulnerable populations and represent a major contributor to health disparities. Thus, behavior change represents an essential step in curtailing health disparities, which receives special attention in this 3rd Special Issue. We also devote considerable space to the longstanding challenges of reducing cigarette smoking and use of other tobacco and nicotine delivery products in vulnerable populations, obesity, and for the first time food insecurity. Across each of these topics we include contributions from highly accomplished policymakers and scientists to acquaint readers with recent accomplishments as well as remaining knowledge gaps and challenges.

Keywords

Behavior change; Chronic health conditions; Substance use disorders; Cigarette smoking; Tobacco use; Tobacco regulatory science; Obesity; Health disparities; Vulnerable populations; Behavioral economics; Lifestyle

1. Introduction

This Special Issue of Preventive Medicine (PM) is the 3rd in a series that focuses on behavior change, health, and health disparities. The first Special Issue appeared in November 2014 (mailto:http://www.sciencedirect.com/science/journal/00917435/68/supp/C) and the 2nd in November 2015 (http://www.sciencedirect.com/science/journal/00917435/80). Contributors to these Special Issues are selected from among participants in

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Transparency document

The Transparency document related to this article can be found, in the online version.

the Annual Conference on Behavior Change, Health, and Health Disparities that is organized by the Vermont Center on Behavior and Health (VCBH), a National Institutes of Health (NIH) and Food and Drug Administration (FDA) supported biomedical research center located at the University of Vermont (http://www.uvm.edu/medicine/behaviorandhealth/). This select subset of conferees was invited to contribute to this Special Issue because of their exemplary scholarship and outstanding conference presentations. Each contribution underwent thorough peer-review overseen by the Editor-in-Chief in coordination with the Guest Editor. Below I comment briefly on the rationale for organizing these annual conferences and associated publications as well as how the excellent contributions to this 3rd Special Issue advance knowledge in this important area of biomedical research.

2. Behavior change, health, and health disparities

As discussed in the Introductions to the two prior special issues (Higgins, 2014; Higgins, 2015), U.S. population health ranks near the bottom compared to other developed countries despite spending orders of magnitude more on healthcare than any other country. When health experts examine the reasons for this relatively poor state of U.S. population health, there is widespread agreement that unhealthy personal behavior patterns (e.g., cigarette smoking and other substance abuse, physical inactivity and poor food choices, non-adherence with medical prevention and treatment regimens) are the largest contributor to this problem. There is also consensus that reducing the prevalence of these behavior patterns (i.e., behavior change), and associated chronic health conditions, offers the greatest opportunity for improving U.S. population health (Institute of Medicine, 2013; Schroeder, 2007). Because these risk behaviors and associated chronic diseases are overrepresented in economically disadvantaged and other more vulnerable population subgroups, they are also recognized to be direct contributors to the growing problem of health disparities in the U.S. and other developed countries. Perhaps not surprisingly considering this state of affairs, the NIH has made behavior change a cross-institutes priority (NIH Common Fund, 2013). In brief, there is growing recognition of the need to advance scientific understanding and more effective management of chronic health conditions where personal behavior is a proximal cause (e.g., cardiovascular disease, obesity, site-specific cancers, substance use disorders, type-2 diabetes).

The VCBH, its annual conference, and this series of Special Issues of PM on behavior change, health, and health disparities were established to address this need. More specifically, the mission of the VCBH is to support and grow biomedical research examining relationships between unhealthy behavior patterns and risk for chronic disease and premature health. We prioritize research that uses the principles and methods of behavioral economics and behavioral pharmacology to (a) delineate underlying behavioral processes involved in risk for unhealthy behavior and (b) develop more effective behavior-change interventions. Considerable effort is also devoted to the essential task of characterizing health-related behavior patterns, associated risk factors, and adverse health impacts in vulnerable populations. Each of those priorities is well represented in the contributions to this 3rd Special Issue.

3. Importance of addressing health disparities

The lead article in this Special Issue is from Steven A. Schroeder, MD, a national expert on behavior change, health, and health disparities (Schroeder, 2016—in this issue). Schroeder provides an update on the current standing of U.S. population health relative to other developed countries compared to where it stood at the time of his seminal Shattuck Lecture on this topic (Schroeder, 2007) (also see Higgins, 2014 on this topic). Overall, the news is not good in that the gap has grown larger. At first blush that is surprising in light of the considerable progress that has been made in the U.S. relative to other developed countries in reducing prevalence of cigarette smoking and other tobacco consumption (Higgins, 2014). However, as Schroeder notes, there is a considerable time lag between changes in cigarette smoking and the realization of associated health impacts, which is likely a factor at play here. However, Schroeder also underscores how those gains in reducing U.S. tobacco consumption were unevenly distributed across the population. That is, they were disproportionately seen among the more affluent, and have changed relatively little among more vulnerable populations, including those who are economically disadvantaged, have psychiatric conditions, sexual minorities, and other socially marginalized segments of the U.S. population. These subgroups are also disproportionately impacted by other behavior and health problems (e.g., obesity, unwanted pregnancies, other substance use disorders) that collectively account for a considerable portion of the growing problem of health disparities. The overarching message of Schroeder's essay is that reducing health disparities is key to improving U.S. population health and its relative standing in the international community. We at the VCBH concur wholeheartedly with that assessment, which is reflected in the other invited contributions to this Special Issue, including an entire section devoted to the use of tobacco and nicotine delivery products in vulnerable populations.

4. Leveraging behavioral science

Consistent with the VCBH mission, we prioritized contributions that explicitly underscore the application of principles and methods of behavioral science to advancing knowledge on vulnerability to unhealthy behavior patterns and improving the efficacy and reach of behavior change interventions.

4.1. Behavioral economics

The discipline of behavioral economics is making innovative and substantive contributions to this emerging area of behavior and health research. Bickel and colleagues contributed an essay (Bickel et al., 2016—in this issue) outlining five defining dimensions of this approach to studying health behaviors: (1) provides novel *conceptual systems* to inform scientific understanding of health behaviors; (2) *translates* scientific understanding into practical and effective behavior-change interventions; (3) leverages varied aspects of behavior *change* beyond increases or decreases in frequency; (4) recognizes and exploits *trans-disease* processes and interventions; and (5) leverages *technology* in efforts to maximize efficacy, cost effectiveness, and reach. These are offered as helpful guideposts in defining this emerging area of research. While not unique to behavioral economics, these dimensions in combination represent an approach that is having broad reach and considerable efficacy in

the area of health-related behavior change in the U.S. and internationally as the contributions to this Special Issue and elsewhere demonstrate.

In the area of substance use disorders, Murphy and Dennhardt (2016—in this issue) offer a behavioral economic conceptual analysis of processes underpinning vulnerability to alcohol and drug misuse among young adults. They also underscore the need for lower intensity and less expensive behavioral economic interventions that can be made available to college students and other young adults whose substance misuse is not sufficiently severe to warrant formal treatment but nevertheless places them at risk for academic failure, accidents, sexual misconduct, etc. In short, they provide a conceptually strong, empirically sound approach to understanding and reducing substance misuse among young adults.

Turning to those with more severe substance use disorders, Tidey (2016—in this issue) provides a brief and insightful review of the potential for a behavioral economic approach to improve efforts to decrease cigarette smoking among those with severe mental illness. She outlines novel ways that behavioral economic strategies might be combined with efficacious medications (e.g., varenicline) to reduce smoking in this highly difficult-to-treat population. Included among the behavioral economic strategies mentioned as possible candidates for combining with varenicline is contingency management (i.e., financial incentives). Exploring that combination seems very promising. Indeed, a rigorous trial examining the efficacy and cost-effectiveness of a long-term (i.e., maintenance) incentives plus medication intervention for smoking abstinence among those with serious mental illness seems long overdue.

Davis and colleagues (Davis et al., 2016—in this issue) provide the third in a programmatic series of reviews on the efficacy of contingency management in the form of vouchers exchangeable for retail items or other monetary reinforcers for treating substance use disorders (also see Higgins et al., 2011; Lussier et al., 2006). Collapsing across the three reviews in the area of addictions, 177 controlled studies on the use of voucher-based CM with substance users have been reported, with 155 (88%) of those studies supporting efficacy. That is an enormous record of empirical support. Unique to this most recent review is that approximately one-third of the studies that conducted follow-up assessments after incentives were discontinued reported continuing benefit from the incentives.

As has been discussed previously in this series (Higgins, 2014), planning and programming for maintenance of longer-term outcomes with incentives and other behavior-change interventions is an important priority that has not received the research attention that it merits. Leahey et al. (2016—in this issue) provide an important demonstration of how financial incentives and peer- or professional-provided social reinforcement can be combined to sustain weight loss in a 10-month maintenance intervention. As Silverman and colleagues have demonstrated with illicit drug abuse, incentives-based interventions can be highly efficacious maintenance interventions (Silverman et al., 2012). Looking forward, there is good reason to believe that such longer-term maintenance interventions are going to be a necessary component to sustaining health-related behavior change. The health-care system has long recognized that need regarding pharmacological treatments of chronic health conditions. I see no reason to anticipate something different for behavioral

interventions. Cost-effectiveness will be an important arbiter of how that all plays out and will become an ever more important element of health-related behavior change research.

Silverman and colleagues contribute a commentary advocating for using the highly efficacious incentives-based Therapeutic Workplace intervention they developed for maintaining long-term abstinence in chronically unemployed illicit drug abusers to combat chronic poverty more generally (2016—in this issue). This is an idea that warrants serious consideration. Not widely recognized is that the large body of research demonstrating the efficacy of financial incentives for substance use disorders contributed to the empirical rationale for initiating the World Bank's Conditional Cash Transfer program to combat chronic poverty in developing countries (Ranganathan and Lagarde, 2012), a large efforts involving many millions of families in incentive programs across several continents. The antipoverty program that Silverman and colleagues are proposing would bring that approach full circle using the focused incremental and experimental approach that has characterized development of the Therapeutic Workplace.

Three contributions to this Special Issue examine behavioral economics and reproductive health. In a creative and important effort to prevent unwanted pregnancies, Heil et al. (2016—in this issue) demonstrate the efficacy of a behavioral economic intervention that combines financial incentives with a World Health Organization intervention for making effective contraception easier to access. The incentives are not provided contingent on using the contraceptives. Instead, they are provided for taking the time to have brief meetings with healthcare staff about contraceptive side effects or other issues that may undermine adherence. The intervention is highly efficacious with a very challenging population (opioid-dependent women) and has the potential for broad reach.

Moving to international health research, Thornton and Godlonton (2016—in this issue) report on the efficacy of offering vouchers to subsidize the cost of adult medical circumcision among men at-risk for sexually-transmitted HIV infection in Malawi. Importantly, their study demonstrates that only lowering the cost to zero (full-cost subsidy) is effective at increasing circumcision among men in the highest risk group. Also in the international setting, Cohen et al. (2016—in this issue) report interesting observational evidence on individual differences in how economically disadvantaged populations make choices about accessing healthcare in the context of obtaining antenatal care in the slums of Nairobi, Kenya.

4.2. Reinforcement and obesity

As I discussed in the Introduction to the 1st Special Issue (Higgins, 2014), no contribution was more important to the tobacco control effort than recognizing the role of nicotine's reinforcing effects in maintaining cigarette smoking and producing addiction. There is now broad scientific consensus within the tobacco field that the reinforcing effects of nicotine drive chronic use and addiction, with the adverse health effects being side effects of chronic exposure to the toxins in tobacco, especially combusted tobacco. Despite compelling evidence that the same reinforcement process is at the core of the obesity problem, with enhanced relative reinforcing effects of food and sedentary activities promoting chronic behavior patterns that have the side effect of fat accumulation and attendant adverse health

outcomes (Carr et al., 2011; Epstein et al., 2007), there is considerably less consensus in the obesity field around such a reinforcement analysis.

In the spirit of advancing discussion of this important topic, we invited three contributions to this 3rd Special Issue on the topic of the reinforcing effects of food. Criscitelli and Avena (2016—in this issue) review preclinical and clinical evidence supporting parallel processes in the reinforcing effects of nicotine and highly palatable foods that produce comparable neurobiological adaptations and addictive states. They also note important parallels in the social stigma associated with smoking and obesity and associated adverse health impacts.

Temple (2016—in this issue) reviews common pathways in the reinforcing effects of drugs and food. She provides evidence that the sensitization process commonly demonstrated with psychomotor stimulant drugs wherein repeated exposure increases sensitivity also occurs with repeated exposure to highly palatable snack foods among obese individuals. Sensitization predicts weight gain in obese individuals and may represent an under-recognized neurobiological adaptation to the reinforcing effects of highly palatable snack foods that contributes to individual differences in obesity risk.

Lastly, Kong and Epstein (2016—in this issue) review a body of evidence that the relative reinforcing effects of food are greater in heavier infants, children, and adults and predict short and long-term weight loss. They demonstrate that in infants of approximately 9 months of age, the relative reinforcing effects of food is positively associated with greater maternal pre-pregnancy body mass index and gestational weight gain, and negatively associated with duration of breastfeeding. This body of evidence suggests that individual differences in the relative reinforcing of food versus non-food reinforcers may underpin risk for childhood obesity.

4.3. Food insecurity

For the first time in this series we have included a contribution on the understudied problem of food insecurity. Althoff et al. (2016—in this issue) note that the problem impacts 14% of U.S. households, which is an unsettling figure for a country of such affluence. They also provide a compelling review of the literature outlining the interrelationships between food insecurity and parental and childhood psychopathology and metabolic disorders, underscoring the need for greater research in this area. Within a behavioral economic framework, scarcity of such a critical source of reinforcement as food is well known to alter decision making in a manner that increases risk for many unhealthy behavior patterns (Mullainathan and Shafir, 2013). It is also well known scientifically that food deprivation increases the relative reinforcing effects of non-nutritive reinforcers including drugs (Brady et al., 1957; Carroll et al., 1979). Moreover, this phenomenon is not specific to just food deprivation. Sleep deprivation, for example, also increases the relative reinforcing effects of cigarette smoking (e.g., Hamidovic and de Wit, 2009) and is associated with increased risk of cigarette smoking, physical inactivity, obesity, and male heavy drinking (Strine and Chapman, 2005). Impoverished environments increase the likelihood of drug consumption and difficulties abstaining from drug use (e.g., Carroll, 1993; Higgins, 1997). In short, deprivation from key sources of reinforcement increases risk for unhealthy consumption

patterns and is almost surely a substantial contributor to the many challenges of unhealthy behavior patterns among vulnerable populations that area addressed in this Special Issue.

5. Tobacco and nicotine delivery product use in vulnerable populations

We are quite fortunate to have a series of excellent contributions to this Special Issue on the use of tobacco and nicotine delivery products that have substantive implications for tobacco control and regulatory efforts in vulnerable populations, including women of reproductive age, individuals with low educational attainment, other substance use disorders, serious mental illness, and other medical co-morbidities.

Leading off this section is a collaborative effort from an FDA working group on vulnerable populations examining co-occurrence of common risk factors for cigarette smoking (Higgins et al., 2016—in this issue). This study demonstrates in a nationally representative sample of U.S. adults that odds of being a smoker typically increase in an independent and summative manner related to the co-occurrence of independent risk factors. Hence, while it may be convenient to refer casually to the very high smoking rates seen, for example, among individuals with other substance use disorders or mental illness, those prevalence rates are usually related to the co-occurring presence of multiple other risk factors (e.g., low educational attainment, poverty, race/ethnicity). Kurti, Keith, et al. (2016a, b—in this issue) report a companion study demonstrating the same independent, summative pattern for co-occurring risk factors for illicit drug use. From a behavioral economic perspective, it seems quite likely that these various risk factors would each be associated with independent constraints on accessing non-drug material and social reinforcers (chronic deprivation) discussed above that have been well documented in experimental studies to increase the relative reinforcing effects of drugs.

The contribution of Chivers et al. (2016—this issue) represents a useful initial step towards understanding risk factors for e-cigarette use among women of reproductive age and how they differ corresponding to tobacco cigarette smoking status. While individual differences in delay discounting predict tobacco cigarette smoking, for example, they do not predict e-cigarette use. Smith et al. (2016, in this issue) provide an insightful review of the sometimes-conflicting evidence regarding sex differences in smoking cessation. They conclude that the preponderance of evidence suggests greater difficulties among women positing a likely influence of factors of greater economic and other forms of deprivation among females compared to males along the lines addressed above. Kurti, Klemperer, and colleagues (2016a, b this issue) provide some further insights into the strong association between the Graduate Equivalence Degree (GED) and smoking risk offering evidence that on average those who hold that degree have a relatively high-risk repertoire akin to sensation seeking that extends well beyond cigarette smoking or use of other substances.

Weinberger et al. (2016, this issue) provide a detailed review of the evidence for greater lifetime and current smoking prevalence, nicotine dependence, and lower cessation rates among those with other substance use disorders, acknowledging subgroup differences relating to gender, age, and race that might be expected considering the independent association of those factors on risk of smoking as outlined above in relation to the

contribution of Higgins et al. characterizing the intersection of co-occurring risk factors for smoking. Similarly, Soyster et al. (2016—in this issue) provide evidence for differences in nicotine withdrawal severity corresponding to the confluence of many of those same independent predictors for being a smoker that Higgins and colleagues discuss.

Stanton and collaborators from the FDA working group on vulnerable populations (2016—in this special issue) provide an original study in a nationally representative sample underscoring how the overall pattern of decreasing cigarette smoking prevalence over time in the general population is not seen among those with one or more chronic health conditions, while also providing novel information on changes over time in use of other tobacco products in these populations.

A final contribution by Mead et al. (2016—in this issue) addresses a related but separate topic of disparities in the benefits of smoke-free policies. These investigators provide evidence of differences by race/ethnicity wherein non-Hispanic whites but not other racial/ethnic subgroups exhibited decreases in acute myocardial infarctions corresponding to implementation of smoke-free policies across a 14-year period in the state of Florida. The authors prudently note the need for additional research and policy efforts to reduce barriers to such benefits reaching racial/ethnic minorities—still another promising avenue to pursue in efforts to reduce health disparities.

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