Title

Evaluating Strategies For Reducing Health Disparities By Addressing The Social Determinants Of Health

Journal

Health Affairs, 35(8)

ISSN

0278-2715

Authors

Thornton, Rachel LJ
Glover, Crystal M
Cené, Crystal W
et al.

Publication Date

2016-08-01

DOI

10.1377/hlthaff.2015.1357

Peer reviewed

HHS Public Access

Author manuscript

Health Aff (Millwood). Author manuscript; available in PMC 2017 August 01.

Published in final edited form as:

Health Aff (Millwood). 2016 August 01; 35(8): 1416–1423. doi:10.1377/hlthaff.2015.1357.

Evaluating Strategies For Reducing Health Disparities By Addressing The Social Determinants Of Health

Rachel L. J. Thornton[1], **Crystal M. Glover**[2], **Crystal W. Cené**[3], **Deborah C. Glik**[4], **Jeffrey A. Henderson**[5], and **David R. Williams**[6,*]

[1]Assistant professor in the Division of General Pediatrics and Adolescent Medicine, Department of Pediatrics, at the Johns Hopkins School of Medicine, in Baltimore, Maryland [2]Assistant professor and BMO Harris Bank Health Disparities Research Fellow at the Rush University Medical School, in Chicago, Illinois [3]Associate professor in the Division of General Medicine and Clinical Epidemiology, Department of Medicine, at the Chapel Hill School of Medicine, University of North Carolina [4]Professor of community health sciences at the UCLA Fielding School of Public Health, University of California, Los Angeles [5]President and CEO of the Black Hills Center for American Indian Health, in Rapid City, South Dakota [6]Florence and Laura Norman Professor of Public Health in the Department of Social and Behavioral Sciences at the Harvard T. H. Chan School of Public Health, in Boston, Massachusetts, and a professor in the Department of African and African American Studies at Harvard University, in Cambridge, Massachusetts

Abstract

Research reveals that the opportunities for healthy choices in homes, neighborhoods, schools, and workplaces can have decisive impacts on health. This article reviews scientific evidence from promising interventions focused on the social determinants of health, and describes ways in which they can improve population health and reduce health disparities. We show that there is sufficient evidence to support policy interventions targeted at education and early childhood; urban planning and community development; housing; income enhancements and supplements; and employment. When available, cost-effectiveness evaluations show that these interventions lead to long-term societal savings; however, more routine attention to cost considerations is needed for these interventions. We also discuss challenges to implementation, including the need for long-term financing in order to scale-up effective interventions for implementation at the local, state, or national level. Although we know enough to act, questions remain about how to optimally scale-up these interventions and maximize their benefits for the most vulnerable populations.

Despite improvements in medical care and in disease prevention, health disparities persist and may be increasing for chronic conditions such as obesity, cardiovascular disease, and cancer.[1, 2] African Americans and other economically disadvantaged racial and ethnic minorities, and populations of all races with low socioeconomic status, experience large disparities in health. The conditions in which people live, learn, work, play, and worship can impact health and produce disparities. Social determinants that negatively impact health and

*Corresponding author: dwilliam@hsph.harvard.edu.

wellbeing include poverty; lack of access to quality education or employment; unhealthy housing; unfavorable work and neighborhood conditions; exposure to neighborhood violence; and the clustering of disadvantage in particular groups of people and in particular places.[3] Exposure to disadvantage can have deleterious neurodevelopmental and biological consequences beginning in childhood that accumulate and produce disease.[4] Yet, current intervention strategies to reduce health disparities do not typically take a "life-course perspective" and tend to be disease-specific, often targeting individual and health systems factors without addressing social determinants.

Interventions targeting individual-level factors include improving health and lifestyle behaviors; reducing sociocontextual barriers, such as access to adequate food and employment resources or support for issues such as domestic violence[5]; and delivering health programs that are culturally and linguistically tailored to specific individuals or groups[6]. Health system interventions that address discrimination, access to care, and quality of care are also important (see the article by Tanjala Purnell and colleagues in this issue).([7]) However, these approaches are not sufficient to address social determinants such as neighborhood conditions or poverty, which are also fundamental drivers of persistent health disparities.[3, 8] For example, if one's neighborhood is unsafe even during daylight hours and an individual lacks the resources to move to a safer neighborhood, interventions targeting outdoor physical activity are unlikely to be effective.[3] As Thomas Frieden's 5-tiered Health Impact Pyramid suggests, the greatest health impact likely will come from interventions that address socioeconomic factors that drive health disparities across multiple conditions.([9])

This article provides an overview of scientific evidence regarding promising interventions addressing social determinants that can improve population health and reduce disparities. The studies included in this article were identified by a working group of investigators from multiple institutions and disciplines who were supported by the NIH-funded Centers for Population Health and Health Disparities (CPHHD). These centers, located at ten institutions across the country, were established to better understand and address disparities associated with cancer and cardiovascular disease. The studies summarized in this article provide major and representative findings regarding the social determinants that are likely to impact health and health disparities. Some of the studies are well known, but the class of interventions discussed are traditionally viewed as outside the purview of health policy research. Most of the CPHHD sites did not test interventions involving social determinants that focus on social structures and policies. We argue that interventions focused on upstream social determinants such as social structures and policies including education and early childhood, urban planning and community development, housing, income enhancements and supplements, and employment, which show promise for achieving enduring improvements in population-level health disparities and should be a central focus of health policy development, implementation, and future research. Though the interventions we discuss in this article have a single social determinant as their primary target, the interventions are likely to have ripple effects across other social determinants. For example, an affordable housing intervention that moves families into lower poverty neighborhoods is likely to improve access to better educational opportunities and neighborhood conditions, as well.

Surveying The Evidence On Social Determinant-Focused Interventions

Education and Early Childhood

Improving access to high-quality education likely improves health.([10]) Additionally, there is strong and consistent empirical evidence that early childhood interventions, such as structured early childhood education and parental support programs, have positive health impacts on children and parents, show promise for addressing economic disadvantage and health disparities, and produce significant return on investment.([11, 12]) These programs can impact health and reduce disparities by strengthening families, improving economic outcomes, enhancing educational achievement, and acting to interrupt or prevent deleterious neurodevelopmental and biological consequences of disadvantage.[4] Because of their potential to improve outcomes for both parents and children, and to produce ongoing health and socioeconomic benefits over time, early childhood interventions can produce a sizeable return on investment. As such, there is a growing consensus that adopting a life course perspective, meaning focusing on how experiences early in life can impact health over a lifetime and even across generations, is one of the most important strategies to improve the nation's health and is critical to reducing and eliminating population-level health disparities.[3, 11]

The Perry Pre-school Project, a two-year program in which African-American 3- and 4-year-olds from a disadvantaged community in Michigan were randomized to intervention or control groups, was designed to improve educational outcomes and reduce the risk of school failure. While the intervention was not designed to assess health impact, it did find that people receiving the intervention had higher rates of safety belt use and engaged in fewer risky health behaviors, such as smoking and illicit substance use in adulthood.([13]) Striking findings related to socioeconomic outcomes suggest the likelihood of improved health as adults, as well. At age 40, those receiving the early childhood intervention had higher education, income and health insurance coverage and lower rates of violent crime, incarceration, welfare receipt and out of wedlock births. ([14])

In the Carolina Abecedarian Project, a longitudinal study in North Carolina, economically disadvantaged, mainly African-American, children ages birth to 5 years were randomly assigned to an early childhood intervention group or a control group.([15]) The intervention consisted of cognitive and social stimulation including supervised play, daily structured academic instruction, and weekly home visits from teachers. At age 21, the intervention group had fewer symptoms of depression, lower marijuana use, a more active lifestyle, and significant educational and vocational benefits compared to the control group.([16, 17]) By their mid-30's, individuals in the intervention group had a lower body mass index and fewer risk factors for cardiovascular and metabolic disease.([15]) Return-on-investment estimates from these and other early childhood education programs range from returns of $3-$17 per dollar invested.([12])

Another initiative, the Nurse-Family Partnership, an early childhood home visitation program targeting low-income first-time mothers, yielded an estimated $18,054 return per family over the long-term ([18]), largely from reductions in crime, violence, child abuse and other high-risk behaviors. These estimates of total benefits combine estimates of benefits

directly experienced by participants (such as improved long-term academic performance and reductions in child abuse and neglect) with estimates of total benefits to taxpayers and others in society (for instance via lower crime rates among participants, which would produce reductions in costs to the criminal justice system).

Studies of the federally funded Head Start program, on the other hand, are not as promising, and show no consistent evidence of positive health impacts.([19]) This may be because of variability in implementation across sites and lack of adherence to a set curriculum. A study of Head Start in Michigan, however, did find that participants had decreased obesity rates compared to non-participating children.([20]) Other early childhood and education interventions have shown improvements in the educational outcomes of disadvantaged children following receipt of interventions such as home visitation or coordinated intensive educational supports, which likely translates into increasing socioeconomic status and, thus, is likely associated with better health outcomes in adulthood. But many promising educational interventions have not been assessed for their impacts on health.([21]) For example, the schools in the Harlem Children's Zone initiative, which combines rigorous education at a Promise Academy charter school with access to multiple community services for children living in a 97-block area in Harlem, eliminated the black-white academic achievement gap in math over the 4 years from enrollment in middle school to the completion of ninth grade.([22]) Similarly the racial academic achievement gap in math and English Language Arts observed at enrollment in elementary school was eliminated by the third grade.([22])

Urban Planning and Community Development

Citing persistent disparities in cardiovascular disease and obesity, the National Prevention Strategy released by the National Prevention, Health Promotion and Public Health Council in June 2011 emphasized the importance of healthy community environments.([23]) Studies have found that changes in nutrition, physical activity, and safety within communities can be achieved through urban planning and community development, which may also improve health behaviors.([24])

While both urban planning and community development have the potential to change the physical landscape of communities, community development is participatory and community-engaged while urban planning is policy-driven. As the paper in this issue by Beti Thompson and colleagues discuss in detail, community-engaged strategies are potentially promising for ameliorating disparities.([25]) For example, a CPHHD community development project in East Los Angeles, where 94 percent of residents are Mexican-American, involved retailers, community organizations, leaders, and high schools in the transformation of corner stores into "healthy stores."([26]) Additionally, research from the Healthy Food Financing Initiative in Philadelphia suggests that policies and programs addressing access to healthy foods can increase awareness of viable options among residents.([27]) While increasing availability and awareness is insufficient by itself, when accompanied by skill-building programs that improve food shopping behaviors and nutritional knowledge of consumers; stocking policies at stores (including where to place products in order to make purchase of

healthy items the default choice); and price adjustments (such as taxes on unhealthy foods or subsidies for healthy foods), such interventions may change behavior.([27])

Urban planning and community development can also encourage physical activity. Project U-Turn in Michigan sought to increase cycling throughout the target region. It also sought to increase active transport to school (such as walking or cycling) and included a Safe Routes to School Program. The project was associated with an increased proportion of children walking to school and an estimated 63 percent increase in active transportation citywide.([28])

In addition, interventions addressing distribution and density of alcohol outlets in low-income communities can impact substance abuse related morbidity, crime, and neighborhood safety.([29]) The Centers for Disease Control and Prevention Community Guide([30]) touts interventions targeting alcohol outlet density as evidenced-based approaches for reducing alcohol use, abuse, and related morbidity. Observational studies provide compelling evidence that decreasing the density of and proximity to alcohol outlets can reduce risk of violent crime([31]), as well. This has implications for reducing health disparities, as alcohol outlets are often over-concentrated in low-income minority communities.([29]) Such evidence has informed urban planning and policy efforts in some communities,([32]) but rigorous evaluations of urban planning policy reforms aimed at curbing overconcentration of alcohol outlets in disadvantaged communities are needed.

Housing

Housing quality and safety are known to impact health.([33,34]) For example, lead abatement and indoor air quality improvement interventions have reduced childhood lead poisoning and asthma morbidity, respectively.([35,36]) Though not originally designed to evaluate health outcomes, housing mobility programs that are intended to increase low-income families' access to economic opportunity and safer neighborhoods have also demonstrated potential health impacts.

Among them is the Yonkers Scattered-Site Public Housing Program, which randomized low-income residents to newly constructed low-income housing in middle-income neighborhoods or to continued residence in poorer neighborhoods. Moving to middle-income neighborhoods was associated with better self-reported health and decreased substance use, increased rates of employment, and decreased exposure to neighborhood violence.([37]) One of the most rigorous housing mobility evaluations in the United States, the Moving to Opportunity for Fair Housing Demonstration Project, also showed significant health impacts. The demonstration project is the only randomized controlled trial of the federally funded housing voucher program, and included participants in multiple cities who were randomized to one of three conditions: receipt of a housing voucher to move to a low-poverty neighborhood (experimental group), receipt of a housing voucher for use anywhere, or continued residence in public housing (control group). Randomization to the experimental group was associated, more than a decade later, with decreased risk of extreme obesity and diabetes and increased physical activity, and improved mental health and wellbeing, for the study population.([38,39])

Income Supplements

In this country, examples of income enhancements and supplements include means-tested programs such as the Special Supplemental Nutrition Program for Women, Infants and Children (WIC); tax credits such as the Earned Income Tax Credit for low-income families; and universal programs such as Supplemental Security Income for the elderly and persons with disabilities (SSI). Most evidence assessing the impact of such programs on health comes from natural experiments.([8]) WIC has been associated with reduced rates of low birth weight, and these effects appear stronger for women with lower versus higher education levels.([40]) The Earned Income Tax Credit has been associated with reductions in low birth weight and maternal smoking.([41]) The same research suggests that some Earned Income Tax Credit-associated health benefits, such as improved birth outcomes, may be greater for blacks than whites. The initiation of the SSI program was associated with decreased mortality for the elderly and larger declines in mortality over time as benefit levels increased.([42])

Another type of income supplement that has been studied is conditional cash transfers, a cash benefit that is contingent upon certain behaviors by eligible beneficiaries. While less studied in high-income countries, research in low- and middle-income countries suggests that conditional cash transfers may be effective in increasing preventive health care utilization and improving nutrition, health behaviors, and birth outcomes, as well.([43]) Conditional cash transfers may be most effective in reducing disparities when they are structured to have maximum impact for those with lower baseline incomes. For example, the amount of cash transfer could increase based on the level of economic disadvantage of beneficiaries such that for the same behaviors, the poorest beneficiaries receive the largest cash amount.([44]) The Five Plus Nuts and Beans pragmatic randomized controlled trial conducted at the Johns Hopkins CPHHD Center suggests that pairing conditional cash transfers for use on groceries with nutritional counseling among African Americans with controlled hypertension is associated with increased fruit and vegetable consumption and improved dietary patterns.([45])

The Great Smoky Mountain Study examined the impact of income supplements to American Indians resulting from casino revenue. These supplements were associated with improved mental health outcomes in adolescence that persisted through early adulthood, increased education and reduced criminal offenses among American Indian youth and the elimination of the racial disparity on both of these outcomes.([46,47])

Employment interventions

Employment can have positive and negative impacts on health via effects on resources, chronic stress, and political power.([48]) There is limited population-level research examining health impacts of employment interventions. Research of the effects of Civil Rights policies, including equal access to employment and access to medical care, and enforcement of voting rights, indicates that the employment and income gains that resulted led to increases in life expectancy between the mid-1960s and the mid-1970s that were larger for blacks than whites, and greater for black women than black men.([49]) Research examining employment interventions for specific vulnerable groups, including low socioeconomic status women and

people with severe mental illness, also suggests that employment interventions could be effective in reducing health disparities in these populations.([50, 51]) For people with severe mental illness, employment improves quality of life, finances, and social support.([51]) Participation in Supported Employment, an evidence-based practice assisting people with severe mental illness to obtain and maintain employment, is associated with improved employment outcomes.([52]) In one study among women receiving financial support from the Temporary Assistance for Needy Families program, public health nursing case management was associated with increased entrance into the workforce, increased preventive health care utilization, and improved depression.([50])

Discussion

Health disparities have significant economic impacts, and reducing and eliminating disparities is a moral imperative that is also advantageous to the US economy. Eliminating disparities in morbidity and mortality for people with less than a college education would have an estimated economic value of $1.02 trillion.([53]) Furthermore, research suggests that eliminating racial and ethnic disparities would reduce medical care costs by $230 billion and indirect costs of excess morbidity and mortality by more than $1 trillion over three years.([54])

As we have shown, there is sufficient evidence to support policy interventions that focus on the social determinants of health, including interventions targeted at education and early childhood, urban planning and community development, housing, income enhancements and supplements, and employment. In particular, early childhood interventions have demonstrated consistent effectiveness at improving long-term health outcomes for disadvantaged children and families, are associated with accrued health-related benefits into adulthood, and are cost effective.([12]) Yet some scholars and public health practitioners continue to raise opposition to strategies that prioritize intervening in early childhood. The arguments against such a focus often center on the fact that the prevalence of costly diseases is much higher among adults than children. While there remains a need for secondary prevention and treatment efforts for populations that are manifesting disparities in morbidity and mortality, intervening in early childhood is the most economical way to interrupt the cascade of events that puts children at increased risk of poor health outcomes in childhood *and* adulthood.

The studies described also have several limitations. First, most of the interventions discussed were not designed a priori to assess health impacts, or health disparities per se. Second, several of the studies were natural experiments that did not randomize participants to intervention or control groups, meaning that systematic differences between intervention recipients and historic controls may exist, and effects of secular trends may not have been measured. Finally, given the long lag-time between the intervention and measurement of health outcomes (particularly for early childhood studies), it is possible that other unmeasured factors that differentiate intervention and control groups are responsible for observed outcomes. Nevertheless, many interventions described – particularly in the early childhood and housing domains and those using long-term follow-up and randomization – represent high-quality scientific evidence of the health impacts of social determinants interventions that are far removed from traditional health policy.

Efforts should focus on scaling-up these interventions for implementation at the regional, state, and national level. Effective implementation will likely require government investment and social welfare reforms, such as universal access to high quality early childhood education programs, access to affordable housing that is commensurate with demand, and efforts to increase housing mobility that are coupled with effective strategies for revitalizing neighborhoods. Many obstacles remain, including lack of political will and access to long-term financing for these interventions, and threats to maintaining the high quality of interventions when scaling-up (for instance, insuring that early childhood education programs maintain their rigor and standardization when broadly disseminated). Future efforts to eliminate health disparities must pay particular attention to effectively funding and sustaining such programs, perhaps through innovative funding avenues such as public-private partnerships, social impact bonds (an innovative funding mechanism whereby government agencies fund investments in social programs that achieve desirable societal outcomes by leveraging savings generated from program successes to spur private sector investment), or tax reform. For example, 2006 legislation approved by voters in Denver, Colorado, sets aside a portion of sales tax revenue to fund the Denver Preschool Program; and voters in San Antonio, TX approved a sales tax increase to fund "Pre-Kindergarten for San Antonio," which offers high-quality full-day preschool for all 4 year-olds.([55])

While more research alone is insufficient to achieve success, there is a critical need to invest in future research designed a priori to evaluate the potential of social determinant-related interventions to improve health outcomes and reduce health disparities. This includes research designed to understand and minimize unanticipated negative consequences of interventions. This issue may be particularly important for optimizing housing and income supplement interventions because both have been associated with unanticipated negative health impacts. For example, the income supplements received in the Great Smoky Mountain Study were also associated with increased accidental deaths and substance use in the specific months that households received payments,([56]) and in increased adolescent obesity among teens in low-income families.([57]) Similarly, in a sub-analysis of the Moving to Opportunity for Fair Housing Demonstration Project, assignment to the experimental group was associated with increased mental health problems among boys.([58]) Future efforts to evaluate the health impacts of housing mobility programs should also assess their impacts on residential stability, social networks, access to services, and exposure to new stressors associated with moving.([59,60])

Further, housing mobility interventions by themselves are an untenable stand-alone strategy for addressing health disparities since they do not eliminate the threats to health that remain for those unable to move. It also is not feasible to move all poor households. Research evaluating the health impacts of neighborhood transformation and revitalization initiatives is also needed. Furthermore, understanding the impacts of social determinant-focused interventions on health cannot come solely from randomized controlled trials. While randomized controlled trials may be the gold standard for research, these are not the only source of generating valuable scientific information. In the real-world, policy-makers should act on the basis of the best available data. Thus, natural experiments and demonstration projects are also critical.([61])

The complex interplay of individual-, family-, and community-level factors impacting health that has resulted in persistent health disparities cannot be reversed with short-term investments. Social determinant-related interventions designed to create structural changes must be coordinated with long-term efforts to change social and cultural norms, build on existing community strengths, and change the opportunity costs associated with healthy behaviors to make the healthy choice the default choice. In order for such interventions to have sustained, intergenerational positive health impacts, they must be coupled with attention to social marketing, behavioral economics, social services, and other supports.

Quantifying cost savings more globally – that is, including savings accrued later in life and from non-health sources – is also critical and raises important questions about how to reallocate savings accrued in the health care sector that result from investments in other sectors, such as education, housing, employment, taxation or income enhancements, and community development and urban planning. Individual program cost-effectiveness studies, although valuable, are insufficient to quantify the economic impact of social determinants interventions, which may have life-long ripple effects across multiple domains. Instead, long-term modeling studies are needed and must address indirect and opportunity costs, and account for indirect effects of upward social mobility on health.

We must also use existing research to “connect-the-dots” between interventions in multiple domains, identify opportunities to increase positive and minimize potential negative health impacts of social determinant-related interventions using logic models.([61]) Such studies should investigate how the same intervention may have differential impacts on children at different ages or on populations from different racial/ethnic or socioeconomic status groups. Future research should also identify how best to deliver social determinant-related interventions so as to achieve overall population health improvement and also reduce health disparities.([62]) For example, a community development intervention that improves physical activity for all community residents could actually widen disparities if increases in physical activity are greater for advantaged versus disadvantaged groups.

Conclusion

Traditional health care sector-focused interventions are insufficient as a primary strategy to address population-level health disparities. Future research, policy, and implementation efforts should concentrate more on interventions targeting upstream social determinants of health, focusing in particular on interventions targeting children and families. Efforts should focus on scaling-up proven interventions in the fields of early childhood and education, housing, urban planning and community development, employment, and income enhancements. They should also focus on strengthening the evidence base through future research and efforts to more comprehensively understand the economic impact of widespread implementation of social determinants-targeted interventions.

Acknowledgments

Rachel Thornton was supported by a grant from the National Heart, Lung, and Blood Institute (Grant No. K23 HL121250-01A1). The authors were supported by the following Centers for Population Health and Health Disparities grants from the National Cancer Institute and the National Heart, Lung, and Blood Institute. Beti

Thompson, principal investigator (PI), Understanding and preventing breast cancer disparities in Latinas (Grant No. P50CA148143-01); David R. Williams, PI, Lung Cancer Disparities Center: jointly addressing race and socioeconomic status (Grant No. P50CA148596-01); Lisa A. Cooper, PI, Johns Hopkins Center to Eliminate Cardiovascular Health Disparities (Grant No. P50HL105187-01); Katherine L. Tucker, PI, Boston Puerto Rican Health Study-CVD risk factors (Grant No. P50HL105185-01); Electra D. Paskett, PI, Reducing cervical cancer in Appalachia (Grant No. P50CA105632-06); Lynda H. Powell, PI, Rush Center for Urban Health Equity (Grant No. P50HL105189-01); Alexander N. Ortega, PI, Family and neighborhood interventions to reduce heart disease risk in East Los Angeles (Grant No. P50HL105188-01); Richard Warnecke, PI, University of Illinois at Chicago Center for Population Health and Health Disparities (Grant No. P50CA106743-06); Alice S. Ammerman and Cam Patterson, PI, Center for Reduced CVD Disparities: genes, clinics, and communities (Grant No. P50HL105184-01); and Dedra S. Buchwald, PI, Center for Native Population Health Disparities (Grant No. P50CA148110-01).

Notes

1. Ogden CL, Carroll MD, Kit BK, Flegal KM. Prevalence of childhood and adult obesity in the United States, 2011–2012. JAMA. 2014; 311:806–14. [PubMed: 24570244]
2. Petrelli NJ, Winer EP, Brahmer J, Dubey S, Smith S, Thomas C, et al. Clinical cancer advances 2009: Major research advances in cancer treatment, prevention, and screening–a report from the american society of clinical oncology. J Clin Oncol. 2009; 27:6052–69. [PubMed: 19901123]
3. Braveman P, Egerter S, Williams DR. The social determinants of health: Coming of age. Annu Rev Public Health. 2011; 32:381–98. [PubMed: 21091195]
4. Shonkoff JP, Boyce WT, McEwen BS. Neuroscience, molecular biology, and the childhood roots of health disparities: Building a new framework for health promotion and disease prevention. JAMA. 2009; 301:2252–9. [PubMed: 19491187]
5. Haas JS, Linder JA, Park ER, Gonzalez I, Rigotti NA, Klinger EV, et al. Proactive tobacco cessation outreach to smokers of low socioeconomic status: A randomized clinical trial. JAMA. 2014; 175:218–26.
6. Ohrig E, Geiss HC, Haas BM, Schwandt P. The Prevention Education Program (PEP) Nuremberg: Design and baseline data of a family oriented intervention study. Int J Obes Relat Metab Disord. 2001; 25:S89–S92. [PubMed: 11466597]
7. [COPYEDITORS: Reference to Tanjala Purnell's paper in this issue goes here.]
8. Williams DR, Mohammed SA. Racism and health II: A needed research agenda for effective interventions. The Am Behavioral Scientist. 2013; 57:1200–26.
9. Frieden TR. A framework for public health action: The health impact pyramid. Am J Public Health. 2010; 100:590–5. [PubMed: 20167880]
10. Cohen AK, Syme SL. Education: A missed opportunity for public health intervention. Am J Public Health. 2013; 103:997–1001. [PubMed: 23597373]
11. Heckman JJ. Skill formation and the economics of investing in disadvantaged children. Science. 2006; 312:1900–2. [PubMed: 16809525]
12. Karoly, LA., Kilburn, MR., Cannon, JS. Early childhood interventions: Proven results, future promise. Santa Monica, CA: RAND Corporation; 2005.
13. Muennig P, Schweinhart L, Montie J, Neidell M. Effects of a prekindergarten educational intervention on adult health: 37-year follow-up results of a randomized controlled trial. Am J Public Health. 2009; 99:1431–7. [PubMed: 19542034]
14. Schweinhart, LJ., Montie, J., Xiang, Z., Barnett, WS., Belfield, CR., Nores, M. Lifetime effects: The High/Scope Perry Preschool study through age 40. Ypsilanti, MI: High/Scope Press; 2005.
15. Campbell F, Conti G, Heckman JJ, Moon SH, Pinto R, Pungello E, et al. Early childhood investments substantially boost adult health. Science. 2014; 343:1478–85. [PubMed: 24675955]
16. Campbell FA, Pungello EP, Burchinal M, Kainz K, Pan Y, Wasik BH, et al. Adult outcomes as a function of an early childhood educational program: An Abecedarian project follow-up. Dev Psychol. 2012; 48:1033–43. [PubMed: 22250997]
17. Muennig P, Robertson D, Johnson G, Campbell F, Pungello EP, Neidell M. The effect of an early education program on adult health: The Carolina Abecedarian project randomized controlled trial. Am J Public Health. 2011; 101:512–6. [PubMed: 21233425]

18. Lee, S., Aos, S., Miller, M. Evidence-based programs to prevent children from entering and remaining in the child welfare system: Benefits and costs for Washington. Olympia, WA: Washington State Institute for Public Policy; 2008. Contract No.: 08-07-3901
19. Puma, M., Bell, S., Cook, R., Heid, C., Shapiro, G., Broene, P., et al. Head Start impact study. Final report. Administration for Children & Families; 2009.
20. Lumeng JC, Kaciroti N, Sturza J, Krusky AM, Miller AL, Peterson KE, et al. Changes in body mass index associated with Head Start participation. Pediatrics. 2015; 135:e449–56. [PubMed: 25583912]
21. Cullen JB, Levitt SD, Robertson E, Sadoff S. What can be done to improve struggling high schools. J Econ Perspect. 2013; 27(2):133–52.
22. Dobbie W, Fryer RG. Are high-quality schools enough to increase achievement among the poor? Evidence from the Harlem children's zone. American Economic Journal: Applied Economics. 2011; 3(3):158–87.
23. Council, NP., editor. National prevention strategy. Washington, DC: Office of the Surgeon General; 2011.
24. Fenton M. Community design and policies for free-range children: Creating environments that support routine physical activity. Childhood Obesity. 2012; 8:44–51. [PubMed: 22799480]
25. [COPYEDITORS: Reference to Beti Thompson's paper in this issue goes here.]
26. Ortega AN, Albert SL, Sharif MZ, Langellier BA, Garcia RE, Glik DC, et al. Proyecto mercadofresco: A multi-level, community-engaged corner store intervention in east Los Angeles and Boyle Heights. J Community Health. 2014; 40(2):347–56.
27. Cummins S, Flint E, Matthews SA. New neighborhood grocery store increased awareness of food access but did not alter dietary habits or obesity. Health Aff (Millwood). 2014; 33:283–91. [PubMed: 24493772]
28. TenBrink DS, McMunn R, Panken S. Project U-Turn: Increasing active transportation in Jackson, Michigan. Am J Prev Med. 2009; 37:S329–35. [PubMed: 19944932]
29. Laveist TA, Wallace JM Jr. Health risk and inequitable distribution of liquor stores in African American neighborhood. Soc Sci Med. 2000; 51:613–7. [PubMed: 10868674]
30. The Guide to Community Preventive Services. The community guide - summary - excessive alcohol consumption: Regulation of alcohol outlet density 2007. Available from: http://www.thecommunityguide.org/alcohol/outletdensity.html
31. Yu Q, Scribner R, Carlin B, Theall K, Simonsen N, Ghosh-Dastidar B, et al. Multilevel spatio-temporal dual changepoint models for relating alcohol outlet destruction and changes in neighbourhood rates of assaultive violence. Geospatial Health. 2008; 2:161–72. [PubMed: 18686265]
32. Thornton RLJ, Greiner A, Fichtenberg CM, Feingold BJ, Ellen JM, Jennings JM. Achieving a healthy zoning policy in Baltimore: Results of a health impact assessment of the transform Baltimore zoning code rewrite. Public Health Rep. 2013; 128(Supplement 3):87–103. [PubMed: 24179284]
33. Bostic RW, Thornton RLJ, Rudd EC, Sternthal MJ. Health in all policies : The role of the US department of housing and urban development and present and future challenges. Health Aff (Millwood). 2012; 31:2130–7. [PubMed: 22914341]
34. Krieger J, Higgins DL. Housing and health: Time again for public health action. Am J Public Health. 2002; 92:758–68. [PubMed: 11988443]
35. Meyer, Pa, McGeehin, Ma, Falk, H. A global approach to childhood lead poisoning prevention. International Journal of Hygiene and Environmental Health. 2003; 206:363–9. [PubMed: 12971691]
36. Krieger JW, Song L, Takaro TK, Stout J. Asthma and the home environment of low-income urban children: Preliminary findings from the Seattle-King County healthy homes project. Journal of urban health : bulletin of the New York Academy of Medicine. 2000; 77:50–67. [PubMed: 10741842]
37. Fauth RC, Leventhal T, Brooks-Gunn J. Short-term effects of moving from public housing in poor to middle-class neighborhoods on low-income, minority adults' outcomes. Soc Sci Med. 2004; 59:2271–84. [PubMed: 15450703]

38. Ludwig J, Sanbonmatsu L, Gennetian L, Adam E, Duncan GJ, Katz LF, et al. Neighborhoods, obesity, and diabetes–a randomized social experiment. N Engl J Med. 2011; 365:1509–19. [PubMed: 22010917]
39. Ludwig J, Duncan GJ, Gennetian LA, Katz LF, Kessler RC, Kling JR, et al. Neighborhood effects on the long-term well-being of low-income adults. Science. 2012; 337(6101):1505–10. [PubMed: 22997331]
40. Hoynes H, Page M, Stevens AH. Can targeted transfers improve birth outcomes? J Public Econ. 2011; 95:813–27.
41. Hoynes H, Miller D, Simon D. Income, the earned income tax credit, and infant health. American Economic Journal: Economic Policy. 2015; 7:172–211.
42. Arno PS, House JS, Viola D, Schechter C. Social security and mortality: The role of income support policies and population health in the United States. J Public Health Policy. 2011; 32:234–50. [PubMed: 21326333]
43. Ranganathan M, Lagarde M. Promoting healthy behaviours and improving health outcomes in low and middle income countries: A review of the impact of conditional cash transfer programmes. Prev Med. 2012; 55(Suppl):S95–S105. [PubMed: 22178043]
44. Barham T. A healthier start: The effect of conditional cash transfers on neonatal and infant mortality in rural Mexico. J Dev Econ. 2011; 94:74–85.
45. Miller ER, Cooper LA, Carson KA, Wang N-Y, Appel LJ, Gayles D, et al. A dietary intervention in urban African Americans: Results of the “five plus nuts and beans” randomized trial. Am J Prev Med. 2015
46. Costello EJ, Erkanli A, Copeland W, Angold A. Association of family income supplements in adolescence with development of psychiatric and substance use disorders in adulthood among an American Indian population. JAMA. 2010; 303(19):1954–60. [PubMed: 20483972]
47. Akee RKQ, Copeland WE, Keeler G, Angold A, Costello EJ. Parents’ incomes and children’s outcomes: A quasi-experiment using transfer payments from casino profits. American Economic Journal: Applied Economics. 2010; 2(1):86–115. [PubMed: 20582231]
48. Tsui EK. Sectoral job training as an intervention to improve health equity. Am J Public Health. 2010; 100(Suppl):S88–94. [PubMed: 20147666]
49. Kaplan, GA., Ranjit, N., Burgard, S. Lifting gates–lengthening lives: Did civil rights policies improve the health of african-american woman in the 1960s and 1970s?. In: Schoeni, RF.House, JS.Kaplan, GA., Pollack, H., editors. Making americans healthier: Social and economic policy as health policy. New York: Russell Sage Foundation Publications; 2008. p. 145-69.
50. Kneipp SM, Kairalla JA, Sheely AL. A randomized controlled trial to improve health among women receiving welfare in the US: The relationship between employment outcomes and the economic recession. Soc Sci Med. 2013; 80:130–40. [PubMed: 22963921]
51. Luciano A, Bond GR, Drake RE. Does employment alter the course and outcome of schizophrenia and other severe mental illnesses? A systematic review of longitudinal research. Schizophr Res. 2014; 159:312–21. [PubMed: 25278105]
52. Mueser KT, Bond GR, Essock SM, Clark RE, Carpenter-Song E, Drake RE, et al. The effects of supported employment in latino consumers with severe mental illness. Psychiatr Rehabil J. 2014; 37:113–22. [PubMed: 24912060]
53. Schoeni RF, Dow WH, Miller WD, Pamuk ER. The economic value of improving the health of disadvantaged americans. Am J Prev Med. 2011; 40(1, Supplement 1):S67–S72. [PubMed: 21146781]
54. LaVeist TA, Gaskin DJ, Richard P. Estimating the economic burden of racial health inequalities in the United States. Int J Health Serv. 2011; 41(2):231–8. Epub 2011/05/14. [PubMed: 21563622]
55. Robert Wood Johnson Foundation Commission to Build a Healthier America. Time to act: Investing in the health of our children and communities. 2014.
56. Bruckner TA, Brown RA, Margerison-Zilko C. Positive income shocks and accidental deaths among Cherokee Indians: A natural experiment. Int J Epidemiol. 2011; 40:1083–90. [PubMed: 21527447]
57. Akee, RKQ., Simeonova, E., Copeland, W., Angold, A., Costello, JE. Does more money make you fat? The effects of quasi-experimental income transfers on adolescent and young adult obesity.

Institute for the Study of Labor. , editor. Bonn, Germany: 2010. p. 1-49.IZA Discussion Paper Series

58. Kessler RC, Duncan GJ, Gennetian La, Katz LF, Kling JR, Sampson Na, et al. Associations of housing mobility interventions for children in high-poverty neighborhoods with subsequent mental disorders during adolescence. JAMA. 2014; 311:937–48. [PubMed: 24595778]
59. Darrah J, DeLuca S. "Living here has changed my whole perspective": How escaping inner-city poverty shapes neighborhood and housing choice. J Policy Anal Manage. 2014; 33(2):350–84.
60. Rosenblatt P, DeLuca S. "We don't live outside, we live in here": Neighborhood and residential mobility decisions among low-income families. City & Community. 2012; 11:254–84.
61. Braveman PA, Egerter SA, Woolf SH, Marks JS. When do we know enough to recommend action on the social determinants of health? Am J Prev Med. 2011; 40:S58–66. [PubMed: 21146780]
62. Frohlich KL, Potvin L. Transcending the known in public health practice: The inequality paradox: The population approach and vulnerable populations 353. Am J Public Health. 2008; 98:216–21. [PubMed: 18172133]