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SEARCH STRATEGY

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Structuring Sexual Pleasure: Equitable Access to Biomedical HIV Prevention for Black Men Who Have Sex with Men

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ABSTRACT (ENGLISH)

What comes to mind when you hear the words "Black men" and "sex"? If you answered "risk," "danger," or "HIV/AIDS," your response aligns with the primary finding of our critical review of social and behavioral science research on US Black men's sexualities. We analyzed 668 articles on Black men and sexuality before 1981 (before the HIV/AIDS epidemic) and between 2006 and 2016, and found that the vast majority (84%; n = 559) focused on sexual health and sexual risk (mostly HIV), and on Black gay, bisexual, and other men who have sex with men (GBMSM), a group disproportionately affected by HIV/AIDS. Research on sexual pleasure, by contrast, was virtually nonexistent for Black men regardless of sexual identity. With few exceptions- notable for their emphasis on love, satisfaction, affection, sexual intimacy, and pleasure- risk, danger, and deficit, not sexual pleasure, were the primary frame for Black GBMSM's sexualities and sexual health. For Black GBMSM, our focus, the implications of this negative emphasis are grave because it ignores possibilities for Black GBMSM to develop healthy, emotionally intimate, trusting, and sexually pleasurable relationships with partners regardless of HIV status. Sexual pleasure is inextricably linked to sexual health and sexual rights. Sexual health, according to the World Health Organization's (WHO's) definition, (p5) is... a state of physical, emotional, mental and social well-being in relation to sexuality . . . not merely the absence of disease, dysfunction or infirmity. Sexual health requires a positive and respectful approach to sexuality and sexual relationships as well as the possibility of having pleasurable and safe sexual experiences, free of coercion, discrimination, and violence. Contrasted with WHO's attention to sexual pleasure, conventional US public health approaches tend to emphasize problematic aspects of sexuality: sexually transmitted infections, unintended pregnancies, and sexual violence. Implicit in the title of the prevailing standard of sexual health in the United States, the 2001 US Surgeon General's Call to Action to Promote Sexual Health and Responsible Sexual Behavior (https://www.ncbi.nlm.nih. gov/pubmed/20669514), is the notion that morality (i.e., "Responsible") and individuals alone-not individuals in conjunction with social- structural context-shape sexual health. Public health discourses have historically conceptualized sexual pleasure primarily as an individual-level experience, something achieved alone or with others, rather than an experience structured by interpersonal practices, policies, and laws (e.g., discrimination, stigma). There are numerous examples of the latter. These include laws criminalizing certain sexual behaviors among consenting adults (e.g., sodomy before the 2003 US Supreme Court Lawrence v. Texas ruling); the lack of legal protections against discrimination for sexual and gender minorities (e.g., 26 states provide no explicit antidiscrimination protections for lesbian, gay, bisexual, and transgender people); laws that criminalize HIV-positive people's sexual expression regardless of HIV disclosure; and restrictions on insurance coverage for contraception (e.g., a 2017 executive order paved the way for federal rules-since overturned by courts-that would have exempted contraception coverage based on moral or religious objections). Inequitable access to biomedical HIV prevention methods represents another structural barrier to Black GBMSM's sexual pleasure.

FULL TEXT

What comes to mind when you hear the words "Black men" and "sex"? If you answered "risk," "danger," or "HIV/AIDS," your response aligns with the primary finding of our critical review of social and behavioral science research on US Black men's sexualities.1 We analyzed 668 articles on Black men and sexuality before 1981 (before the HIV/AIDS epidemic) and between 2006 and 2016, and found that the vast majority (84%; n = 559) focused on sexual health and sexual risk (mostly HIV), and on Black gay, bisexual, and other men who have sex with men (GBMSM), a group disproportionately affected by HIV/AIDS. Research on sexual pleasure, by contrast, was virtually nonexistent for Black men regardless of sexual identity. With few exceptions- notable for their emphasis on love, satisfaction, affection, sexual intimacy, and pleasure- risk, danger, and deficit, not sexual pleasure, were the primary frame for Black GBMSM's sexualities and sexual health. For Black GBMSM, our focus, the implications of this negative emphasis are grave because it ignores possibilities for Black GBMSM to develop healthy, emotionally intimate, trusting, and sexually pleasurable relationships with partners regardless of HIV status.

Sexual pleasure is inextricably linked to sexual health and sexual rights.2,3 Sexual health, according to the World Health Organization's (WHO's) definition,3(p5) is

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Contrasted with WHO's attention to sexual pleasure, conventional US public health approaches tend to emphasize problematic aspects of sexuality: sexually transmitted infections, unintended pregnancies, and sexual violence. Implicit in the title ofthe prevailing standard of sexual health in the United States, the 2001 US Surgeon General's Call to Action to Promote Sexual Health and Responsible Sexual Behavior (https://www.ncbi.nlm.nih.gov/pubmed/20669514), is the notion that morality (i.e., "Responsible") and individuals alone-not individuals in conjunction with social- structural context-shape sexual health.

Public health discourses have historically conceptualized sexual pleasure primarily as an individual-level experience, something achieved alone or with others, rather than an experience structured by interpersonal practices, policies, and laws (e.g., discrimination, stigma). There are numerous examples of the latter. These include laws criminalizing certain sexual behaviors among consenting adults (e.g., sodomy before the 2003 US Supreme Court Lawrence v. Texas ruling); the lack of legal protections against discrimination for sexual and gender minorities (e.g., 26 states provide no explicit antidiscrimination protections for lesbian, gay, bisexual, and transgender people); laws that criminalize HIV-positive people's sexual expression regardless of HIV disclosure; and restrictions on insurance coverage for contraception (e.g., a 2017 executive order paved the way for federal rules-since overturned by courts-that would have exempted contraception coverage based on moral or religious objections). Inequitable access to biomedical HIV prevention methods represents another structural barrier to Black GBMSM's sexual pleasure.

STATE-STRUCTURED ACCESS TO SEXUAL PLEASURE

The historical legacy of Black sexuality in the United States is largely a state-structured one. Slavery and systemic racism denied Black people agency over their own bodies and, in turn, their sexual pleasure. During slavery and after slavery, negative stereotypes of Black people as hypersexual bolstered White supremacy. Evidence that some health care providers have used hypersexual stereotypes about Black GBMSM in deciding whether to prescribe them preexposure prophylaxis (PrEP) affirms that these sexual toxic stereotypes persist and that public health practice generally regards Black GBMSM's sexualities as problematic rather than just human. We contend that inequitable access to biomedical HIV prevention methods, namely PrEP4,5 and treatmentas-prevention (TasP), represents the latest manifestation of how the state structures not only sexual health inequities but also Black GBMSM's access to sexual pleasure.

For Black GBMSM, HIVpositive and HIV-negative alike, two very effective tools are now available to facilitate sexual expression and sexual agency and enable the pursuit of sexual relationships without fear or shame: PrEP6 and

TasP. Daily or on-demand (i.e., "event-driven") PrEP dosage affords Black GBMSM men control over negotiating condomless sex for enhanced intimacy and sexual pleasure. PrEP offers newfound opportunities to eschew sexual-riskonly-centered perspectives in favor of more strengths-based and sex-positive considerations for Black GBMSM's pursuit of sexual pleasure, intimacy, agency, and sexual expression (e.g., assertive sexual partnering). As an extension of evidence that TasP reduces infectiousness-and galvanizing the Undetectable = Untransmittable global campaign-there is now definitive empirical evidence that sustained viral suppression among people living with HIV dramatically reduces risk of transmission to sexual partners.7

And yet, Black GBMSM lack equitable access to biomedical HIV-prevention technologies.4,5 Compared with White GBMSM, Black GBMSM are significantly less likely to report PrEP awareness, having discussed PrEP with a health care provider, and PrEP use.4 For Black GBMSM who choose not to use condoms by mutual agreement with sexual partners-based upon personal preferences or for purposes of conception- persistent inequities in HIV treatment and PrEP uptake5 produce structural inequalities in access to sexual pleasure. In essence, by virtue of having greater access to PrEP than Black GBMSM, White GBMSM have more access to condomless sexual pleasure unencumbered by fear of contracting or transmitting HIV.

PrEP is generally only accessible by prescription. As such, medical providers' stigma about Black GBMSM, PrEP, and HIV are critical barriers to PrEP uptake. Moreover, stigma curtails Black GBMSM's ability to negotiate and achieve sexual pleasure regardless of their own or their partners' HIV statuses. Because sexual pleasure is central to sexual rights and sexual health,2 we challenge public health practitioners and medical providers to adopt more sex-positive frames that acknowledge the variety of ways that Black GBMSM express their sexualities, including, but not limited to, sex in emotionally intimate partnerships, condomless sex, sexually exclusive and nonexclusive partnerships, voluntary sex work, and sex with women and transgender partners. Concomitant with equitable population-level PrEP scale-up and to capitalize on TasP's well-established effectiveness, we also encourage researchers to abandon the exclusively sexual risk frame that characterizes most research on Black GBMSM by incorporating questions about sexual pleasure, satisfaction, intimacy, and affection.

Reconceptualizing public health approaches to Black GBMSM's sexual expression aligns with the federal plan to End the HIV Epidemic and other efforts to reduce inequities in HIV treatment and PrEP uptake cascades. Structurallevel interventions-such as expansion of Medicaid under the Affordable Care Act, inclusion of emtricitabine/ tenofovir alafenamide and emtricitabine/tenofovir disoproxil fumarate in Medicaid PrEP formularies, offering new PrEP regimens over the counter (e.g., as recently signed into California law), and sameday treatment initiations for individuals newly diagnosed with HIV-will further enable researchers and practitioners to jettison pervasive risk-only- centered approaches to Black GBMSM's sexual expression.

PROMOTING ALL BLACK PEOPLE'S SEXUAL HEALTH

Black GBMSM are the focus of our editorial, but hardly the only group of Black men for whom issues of equitable access to biomedical HIV prevention and sexual pleasure apply. Critical race theory and intersectionality perspectives highlight the importance ofcentering the needs of marginalized groups at different intersectional positions to understand and address their specific concerns. Accordingly, there is a dire need for more research and programs that address commonalities and differences in sexual pleasure for Black men at intersectional positions of sexuality and gender over the life course, namely cisgender heterosexual men and transgender men. Substantial empirical gaps exist. Take, for example, the exclusion of transgender men from the US Food and Drug Administration's approval of emtricitabine/ tenofovir alafenamide for PrEP.6 The exclusion is based in part on the implicit assumption that transgender GBMSM engage in receptive vaginal sex only, not receptive anal sex, as well as limited clinical trial data on efficacy among transgender men-yet another example ofhow the state structures sexual pleasure for Black transgender GBMSM. Ensuring that Black GBMSM and, indeed, all Black people, have equitable access to biomedical HIV prevention is vital to improving their sexual health and sexual pleasure and affirming the value of all Black people's lives. /4JPU

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CONTRIBUTORS

Both authors contributed equally to this article.

CONFLICTS OF INTEREST

Neither author has any disclosures or conflicts of interest to report.

Sidebar

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DETAILS

Subject:	Critical theory; Slavery; Human immunodeficiency virus--HIV; Stigma; Morality; Birth control; Intimacy; Sexual behavior; Men; Sexuality; Public health; Sex; Acquired immune deficiency syndrome--AIDS; Federal court decisions; Research; Evidence; Medicaid; Transgender persons; Researchers; Disease prevention; Prevention; Government programs; Tenofovir; Health education; Men who have sex with men; Partnerships; Stereotypes; Emtricitabine; Medical treatment; Ability; Sexually transmitted diseases--STD; Gender; Health care access; Sexual health; Executive orders; Black people; Gays &lesbians; Mens health; Behavioral sciences
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Polysubstance Use: A Broader Understanding of Substance Use During the Opioid Crisis

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ABSTRACT (ENGLISH)

Objectives. To understand important changes in co-occurring opioid and nonopioid drug use (i.e., polysubstance use) within the opioid epidemic in the United States. Methods. We analyzed survey data on the past month co-use of prescription and illicit opioids and 12 nonopioid psychoactive drug classes from a national sample of 15 741 persons entering treatment of opioid use disorder. Results. Past-month illicit opioid use increased from 44.8% in 2011 to 70.1% in 2018, while the use of prescription opioids alone dropped from 55.2% to 29.9%, yet overall remained high (94.5% to 85.2%). Past-month use of at least 1 nonopioid drug occurred in nearly all participants (>90%), with significant increases in methamphetamine (+85%) and decreases across nonopioid prescription drug classes (range: -40% to -68%). Conclusions. Viewing opioid trends in a "silo" ignores the fact not only that polysubstance use is ubiquitous among those with opioid use disorder but also that significant changes in polysubstance use should be monitored alongside opioid trends. Public Health Implications. Treatment, prevention, and policymaking must address not only the supply and demand of a singular drug class but also the global nature of substance use overall. (Am J Public Health. 2020;1 10:244-250. doi:10.21 05/ AJPH.2019.305412)

FULL TEXT

Headnote

Objectives. To understand important changes in co-occurring opioid and nonopioid drug use (i.e., polysubstance use) within the opioid epidemic in the United States.

Methods. We analyzed survey data on the past month co-use of prescription and illicit opioids and 12 nonopioid psychoactive drug classes from a national sample of 15 741 persons entering treatment of opioid use disorder.

Results. Past-month illicit opioid use increased from 44.8% in 2011 to 70.1% in 2018, while the use of prescription opioids alone dropped from 55.2% to 29.9%, yet overall remained high (94.5% to 85.2%). Past-month use of at least 1 nonopioid drug occurred in nearly all participants (> 90%), with significant increases in methamphetamine (+85%) and decreases across nonopioid prescription drug classes (range: -40% to -68%).

Conclusions. Viewing opioid trends in a "silo" ignores the fact not only that polysubstance use is ubiquitous among those with opioid use disorder but also that significant changes in polysubstance use should be monitored alongside opioid trends.

Public Health Implications. Treatment, prevention, and policymaking must address not only the supply and demand of a singular drug class but also the global nature of substance use overall. (Am J Public Health. 2020;110:244-250. doi:10.2105/ AJPH.2019.305412)

The substantial public health impact of the opioid epidemic in the United States is well documented. According to the Centers for Disease Control and Prevention (CDC), 47 600 individuals died from an opioid overdose in 2017,1 with countless others revived by the timely use of the opioid antagonist naloxone (Narcan). The origins of the current epidemic can be traced back to the proliferation of opioid prescriptions to manage chronic pain in the 1990s and the subsequent misuse of these drugs for nontherapeutic purposes, resulting in dramatic increases in treatment admissions for opioid use disorders (OUDs) as well as overdose fatalities, particularly in opioid-naive individuals.2

As these outcomes reached epidemic proportions, a number of mitigating steps were taken to deter abuse and diversion, such as prescription drug monitoring programs,3,4 abuse-deterrent opioid formulations and associated legislation,5,6 new prescribing guidelines,7 pill-mill legislation, and increased physician awareness of the appropriate use of opioids.8 However, as these supply-side interventions began to realize some success in reducing availability of prescription opioids,9,10 a considerable proportion of those with OUD substituted or shifted entirely to using other opioids, primarily heroin,11,12 as that market has expanded. More recently, the increased use of heroin as an initiating opioid,13 along with the proliferation of the highly potent synthetic opioid, fentanyl- either sought out specifically or unknowingly mixed with heroin-has led to a dramatic increase in overdose fatalities.14,15

The continued growth in the opioid epidemic has had the effect of creating a silo, so to speak, in that researchers and policymakers, particularly when it comes to treatment, increasingly are focused almost exclusively on OUD (e.g., medication-assisted treatment that targets only opioids) and its nuanced components (e.g., prevention of doctor shopping through prescription drug monitoring programs), rather than taking a more global view of substance use disorders per se. This opioid-centric perspective ignores a substantial, though often overlooked, empirical body ofresearch that has observed that the majority of those with a substance use disorder are polysubstance users.16-19

In a recent study that used data from the National Survey on Drug Use and Health, those with a prescription OUD had greater prevalence of other substance use disorders than misusers or general users of prescription opioids.20 While many may prefer a specific drug or drug class, use of multiple substances is commonplace, making treatment or policy directed at a single drug less effective than those focusing on substance use overall. Understanding polysubstance use applies not only in the context of the opioid epidemic itself (e.g., use of both prescription and illicit opioids), but also in consideration of co-occurring use ofopioids with a wide array of other substances (e.g., benzodiazepines and stimulants) that have the potential to increase risk for adverse events, relapse following a treatment regimen, or overdose fatalities.21 23 For example, recent overdose mortality data provide evidence ofa relationship between of methamphetamine and opioid use.24,25

For opioid treatment-related policy and programs to be effective in the long term, polysubstance use among opioid-addicted persons needs to be better assessed and understood, particularly over time. In an effort to fill this void, we utilized data from a long-running national opioid surveillance system on treatment-seeking opioid users to evaluate (1) temporal trends in opioid drug use, (2) temporal trends in nonopioid drug use overall and as a function of opioid drug use, and (3) the proliferation of polysubstance use among persons with an OUD.

METHODS

The Survey of Key Informants' Patients (SKIP) Program database is composed of individuals who have entered treatment ofan OUD at any one of the participating treatment centers from across 49 states and Washington, DC, and has been validated against other opioid and substance surveillance systems and shown to be nationally representative.10,26 Surveys are administered at intake to individuals presenting with an OUD at participating treatment centers and who are new admissions to sites (all of whom were not previously enrolled, to minimize repeated participation). This analysis included data from 270 treatment centers (42.6% private, 36.3% public, 16.7% private and public, 4.4% unspecified) recruited by using the Substance Abuse and Mental Health Services Administration Behavioral Health Treatment Services Locator. The SKIP program has collected information regarding co-occurring (i.e., past-month) nonopioid drug use since the second half of 2011. In the event that a participant did not complete the nonopioid drug section, we pursued imputation adjustments to help distinguish between participants who had skipped the section versus those whose nonresponse could reasonably imply nonuse (i.e., "did not use [drugx] in the past month"). To be included in this study, participants must have had to (1) complete the survey between the second half of 2011 and the first half of 2018 and (2) provide information about their past-month nonopioid drug use. The resulting sample included 15 741 participants.

Opioid Drug Use

Participants were given a list of opioids wherein they were instructed to select all of the opioids that they had used "to get high" in the past month. The list consists of 14 prescription opioid classes and only 2 illicit opioids-heroin and

nonprescription fentanyl. To convey the absolute prevalence of prescription and illicit opioids in our sample, we stratified the 15 741 participants into 2 nonexclusive groups (i.e., any prescription opioid and heroin/nonprescription fentanyl; Figure 1a). However, for the sake of future analyses, we created more discrete groupings, stratifying the 15 741 participants into 3 exclusive groups (i.e., prescription opioids only, heroin/nonprescription fentanyl only, or prescription opioids and heroin/nonprescription fentanyl; Figure 1b). Comparative statistics include the absolute percent change and Cochrane-Armitage tests to evaluate significance.

Poiysubstance Use

We definedpolysubstance (i.e., nonopioid drug) use for our SKIP sample as the cooccurring, nonmedical use of any of the following drug classes: nicotine, marijuana, excessive alcohol use defined as having more than 4 drinks in a single day, antidepressants, anxiolytics, muscle relaxants, prescription sleep medications, prescription stimulants, crystal meth, crack or cocaine, hallucinogens, and MDMA. Participants were instructed to indicate which of these drugs they had used for "recreational use, to get high, or for any other non-medical reason" in the past month; with the exception ofprescription stimulants, which did not appear on the survey until the first half of 2015.

To demonstrate temporal differences in drug use patterns among study participants, we compared prevalence rates from the first time point with the last time point (Figures 2 and 3). Figure 2 conveys these prevalence data as a bar chart. To illustrate temporal variation across the analysis period, capping each column is the juxtaposition of each drug's interpolating trend line. Figure 3 illustrates the absolute percent change in prevalence of use for each drug.

Next, we sought to combine data from Figures 1, 2, and 3 to explore group-specific trends in polysubstance use among the 3 exclusive opioid subgroups (i.e., prescription opioids only, heroin/nonprescription fentanyl only, or prescription and heroin/ nonprescription fentanyl). Specifically, we wanted to assess (1) interclass variation (i.e., between opioid subgroups) over time by examining whether opioid subgroup had any association with the total number of nonopioid drug classes used in the past month and (2) intraclass variation (i.e., within opioid subgroups) over time by examining whether there were any changes in the number of nonopioid drugs used in the past month over time. To show these nuances, we created a line (Figure 4a) and bubble chart (Figure 4b) showing temporal variation in polysubstance use both between and within opioid subgroups. Because each bubble represents the proportion of individuals at each time point (located on the x-axis) who had used the respective number of different nonopioid drugs (located on the y-axis), the bubble chart allows an apples-to-apples comparison of nonopioid drug use both within groups (as a function of time) and also between groups (as a function of opioid subgroup and time). We have also added group-specific trend lines to convey the (arithmetic) mean number of nonopioid drugs used, depicting standard error with the shaded gray region (Figure 4a).

RESULTS

The SKIP (n = 15 741) sample was primarily White (79.1%), with a mean age of 33.5 years (SD ±10.3) and fairly split between males (53.9%) and females (46.1%), and in terms of urbanicity (49.3% urban residents). The majority had no health care coverage (42.0%) followed by Medicare or Medicaid (35.6%), and the types of treatment included inpatient (60.0%), outpatient (41.4%), counseling (33.3%), and medication-assisted treatment (8.5%).

Temporal Changes in Opioid Drug Use

Figure 1a shows that from 2011 to 2018, the past-month use ofheroin/nonprescription fentanyl increased from 44.8% in the second half of 2011 to 70.1% in the first half of 2018, an increase of 57%. It is worth noting that the increase in heroin/ nonprescription fentanyl was not mirrored by a comparable decrease in the past month use of prescription opioids; on the contrary, this group maintained a high prevalence in our sample, decreasing roughly 10%, from 94.5% in 2011 to 85.2% in 2018. Figure 1b breaks past-month opioid use down further into 3 mutually exclusive groups: use of prescription opioids only, use of heroin/ nonprescription fentanyl only, or the indiscriminant use of prescription opioids and heroin/nonprescription fentanyl. We observed a marked decline in the prevalence of individuals who used prescription opioids only in the past month, from 55.2% to 29.9% (-46% change from 2011). Conversely, the prevalence of heroin/nonprescription fentanyl-only use increased from 5.5% to 14.8% (+169% change from 2011), and the indiscriminant use of prescription opioids and heroin/nonprescription fentanyl increased from 39.2% to 55.4% (+41% change from 2011). All changes over time were significant at a P level of less than

.001. Temporal Changes in Nonopioid Drug Use

Figure 2 shows the prevalence of pastmonth use for each nonopioid drug surveyed at the initial and final analysis periods, including past-month use ofat least 1 nonopioid drug. To add context, a trend line caps each bar dyad, depicting the standardized interpolations in prevalence throughout the entire analysis period. To summarize these data, Figure 3 shows the percent change from the first time point to the last time point. Past month use of at least 1 nonopioid drug remained substantially high, with 95.8% meeting this criterion in 2011 and 96.4% in 2018. Past-month use of nicotine, alcohol, and marijuana were common among our sample and saw little change over the analysis period, as did the use of crack or cocaine. With the exception ofprescription stimulants, whose relative percent change perhaps belies its nonmonotonic growth pattern (Figure 2), the co-occurring use of all other nonopioid drugs changed demonstrably over time, including a significant increase in prevalence of methamphetamine use (+85%) and significant decreases in anxiolytics (-40%), antidepressants (-46%), prescription sleep medications (-68%), hallucinogens (-44%), MDMA (-57%), and muscle relaxants (-61%). All changes were significant at a P level of less than .001 except for marijuana (P = .18), nicotine (P = .12), crack or cocaine (P = .46), and alcohol (P = .07).

Poiysubstance Use as a Function of Time and Opioid Type

Figures 4a and 4b present data that allow us to compare changes in polysubstance use over time both within and between opioid subgroups. While the trend line is helpful in showing the centrality of the data, the size and scarcity of the bubbles help to show the spread of the data. Overall, individuals classified as indiscriminant users of prescription and illicit opioids also had the highest overall mean number of unique, nonopioid drugs used in the past month (4.3; 95% confidence interval [CI] = 4.27, 4.33), followed by users of prescription opioids only (3.5; 95% CI = 3.47, 3.53) and then users of heroin/ nonprescription fentanyl only (2.6; 95% CI = 2.56, 2.64). This order notwithstanding, over time the mean significantly decreased in the prescription-only group, from 3.7 in 2011 to 3.0 in 2018, and the prescription-heroin/ nonprescription fentanyl group, from 4.3 in 2011 to 3.7 in 2018 (both at P< .001), while the mean significantly increased for the heroin/nonprescription fentanyl-only group, from 2.3 in 2011 to 2.5 in 2018 (P =.007). It should be noted that, because prescription stimulants did not enter the survey until the second half of 2015, the maximum number of different nonopioid drug categories before this time was 11.

DISCUSSION

In agreement with other studies,1,20 we found that, among treatment-seeking opioid users, although past month use of heroin/ nonprescription fentanyl has dramatically increased, the use of prescription opioids nonetheless continues to be a significant part ofthe opioid epidemic, with a prevalence rate higher than that of heroin/nonprescription fentanyl, though decreasing slightly (-10%) over our analysis period. It seems clear from our data that prescription opioids are no longer primarily used exclusively by those with an OUD, but are now most often used in tandem with illicit opioids. This may suggest that while supply-reduction efforts (e.g., prescription drug monitoring programs, prescribing guidelines, pill-mill legislation) may have had their intended effect of decreasing overall physician prescriptions for opioids,9 they may have had the unintended effect of pushing those with an OUD to more potent and inherently riskier drugs, particularly heroin and fentanyl. In particular, this shift has been described in the literature as a function of not only reduced supply of prescription opioids but also practical factors such as price and availability of heroin and fentanyl.11,27,28 As seen with previous supply-reduction efforts (e.g., the Prohibition Era), our data confirm the construct that as long as there is a demand for a product, there will remain strong efforts to provide a supply, in one form or another, to meet demand.

The present study also reinforces the conclusion that polysubstance use is common in those with an OUD; indeed, our results indicate that polysubstance abuse is the norm, not the exception, with nearly the entire sample endorsing at least 1 nonopioid drug used in the past month. In fact, those who used both prescription opioids and heroin/ nonprescription fentanyl, who made up the largest proportion of our sample in 2018, used, on average, 4 other nonopioid drug classes while also using a variety of opioids. What is also striking is that there appear to have been dramatic shifts in nonopioid drug use over time. Specifically, of all the nonopioid drugs we tracked, only 1 had increased significantly from 2011 to 2018-methamphetamine. While increased production, distribution, and access to

methamphetamine has led to its increased use across the country in general,29 it has been suggested that the co-use ofopioids and methamphetamine may establish an equilibrium between the stimulation produced by methamphetamine and the sedation produced by opioids so as to be able to function as normally as possible, or the use of both drugs produces a "roller coaster ride" of a high with 2 entirely different pleasurable sensations.30 These relationships may also help explain why those who used heroin/nonprescription fentanyl exclusively endorsed fewer nonopioid drugs on average: the more potent the drug, the less need there is to supplement use with a multitude ofother substances.

Initially we hypothesized that, as the supply of prescription opioids continued to shrink, many other nonopioid psychoactive drugs-such as benzodiazepines and other sedative-hypnotics-would increase among advanced opioid users, much like what was observed with methamphetamine. Given that these drugs share sedative-like properties with opioids, it seemed reasonable to posit that they would be useful to those with an OUD as either a substitute for an opioid in short supply or as a means of suppressing opioidwithdrawal symptoms.

However, we found no evidence to suggest that this hypothesis has merit. In fact, changes in anxiolytics (e.g., benzodiazepines) represent the most surprising shift as more than half of our sample had used them in the past month in 2011, which steadily dwindled to less than one third in 2018. The reason for this unexpected difference is not completely understood, but it is possible that the implementation of supply-side interventions to limit the diversion and nonmedical use of prescription opioids, as noted previously, has had a spillover effect that has led to reduced diversion and nonmedical use of other prescription drugs, resulting in the observed decreases we observed for all categories of prescription drug types analyzed here, as well as reductions in the mean number of nonopioid substances used by those who had exclusively used prescription opioids.

The implications for these data are important for substance use treatment and policies, which must take into account a more global understanding of substance use, lest the intense focus on opioids lead to mistaking the forest for the trees. Policies aimed at expanding mental health care need to take into account that the links between mental health issues (e.g., depression or anxiety, trauma, life stressors) and substance use (i.e., the Khantzian notion of self-treatment31,32) are likely applicable across substances. More importantly, while providing medication-assisted treatment is an important component of treating OUDs, the reliance on this alone fails to treat both mental health antecedents and the use of nonopioid substances, which appear to be ubiquitous among those entering treatment of an OUD. Understanding these components and including them as part of a comprehensive treatment regimen is vital in improving treatment success and preventing the high rates of relapse that are common among substance users.

There are important limitations in our study. Most significantly, ours is a treatmentbased sample with survey language (i.e., "use to get high") that may not be representative of those who use opioids "recreationally," nonmedically, or do not meet criteria for an OUD. Furthermore, differences in the factors influencing the decision to enter treatment, such as family or court pressures and financial ability, could also limit the heterogeneity of our sample. However, these data make a compelling argument that the treatment of OUDs should include the treatment of substance use disorders on a broader level. ÂfPH

CONTRIBUTORS

AH authors participated in analyzing and interpreting the data, and in drafting and reviewing the article.

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Note. Denver Health retains exclusive ownership of all data, databases, and systems. Subscribers do not participate in data collection nor do they have access to the raw data.

CONFLICTS OF INTEREST

All authors are employees ofWashington University in St Louis, which receives research funding from Denver Health and Hospital Authority. T. J. C. serves as a paid consultant on the Scientific Advisory Board of the RADARS System. None of the authors have a direct financial, commercial, or otherrelationship with any ofthe subscribers of the RADARS System.

HUMAN PARTICIPANT PROTECTION

All protocols were reviewed and approved by the institutional review board at Washington University in St

Sidebar

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DETAILS

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High Ambient Temperature and Infant Mortality in Philadelphia, Pennsylvania: A Case–Crossover Study

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ABSTRACT (ENGLISH)

Objective. To quantify the association between heat and infant mortality and identify factors that influence infant vulnerability to heat. Methods. We conducted a time-stratified case-crossover analysis of associations between ambient temperature and infant mortality in Philadelphia, Pennsylvania, during the warm months of 2000 through 2015. We used conditional logistic regression models to estimate associations of infant mortality with daily temperatures on the day of death (lag 0) and for averaging periods of 0 to 1 to 0 to 3 days before the day of death. We explored modification of associations by individual and census tract-level characteristics and by amounts of green space. Results. Risk of infant mortality increased by 22.4% (95% confidence interval [CI] = 5.0%, 42.6%) for every 1°C increase in minimum daily temperature over 23.9°C on the day of death. We observed limited evidence of effect modification across strata of the covariates. Conclusions. Our results contribute to a growing body of evidence that infants are a subpopulation that is particularly vulnerable to climate change effects. Further research using large data sets is critically needed to elucidate modifiable factors that may protect infants against heat vulnerability. (Am J Public Health. 2020;110:189-195. doi:10.2105/ AJPH.2019.305442)

FULL TEXT

Headnote

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Methods. We conducted a time-stratified case-crossover analysis of associations between ambient temperature and infant mortality in Philadelphia, Pennsylvania, during the warm months of 2000 through 2015. We used conditional logistic regression models to estimate associations of infant mortality with daily temperatures on the day of death (lag 0) and for averaging periods of 0 to 1 to 0 to 3 days before the day of death. We explored modification of associations by individual and census tract-level characteristics and by amounts of green space.

Results. Risk of infant mortality increased by 22.4% (95% confidence interval [CI] = 5.0%, 42.6%) for every 1°C increase in minimum daily temperature over 23.9°C on the day of death. We observed limited evidence of effect modification across strata of the covariates.

Conclusions. Our results contribute to a growing body of evidence that infants are a subpopulation that is particularly vulnerable to climate change effects. Further research using large data sets is critically needed to elucidate modifiable factors that may protect infants against heat vulnerability. (Am J Public Health. 2020;110:189-195. doi:10.2105/ AJPH.2019.305442)

As global temperatures rise, there is a critical need to identify the most heat-vulnerable subpopulations. A growing body ofliterature demonstrates links between high ambient temperatures and excess mortality,1 especially among the elderly.2 9 Only a handful of studies have investigated the relationship between high ambient temperature and mortality among infants.10-13 These few studies have shown that higher ambient temperatures increase the risk of sudden infant death syndrome,10,13infant mortality attributable to conditions originating in the perinatal period,11 and all-cause infant mortality.12

Infants are a potentially heat-susceptible subpopulation because of their inability to adequately thermoregulate. In addition to their physiological immaturity to respond to extreme hot or cold temperatures, infants lack the motor skills to react behaviorally; they are entirely dependent on their caregivers and unable to remove clothing or move to a cooler location if they become too hot. Caregivers may not realize that an infant's core temperature is hot, because infants do not display the expected physiological signs and symptoms. Infants living in cities are of particular

concern. Because of the urban heat island effect, city dwellers are exposed to higher temperatures during the day and experience little reliefat night.14 Characteristics of the urban landscape, including low amounts of vegetation and dense concentrations of buildings and pavement, which absorb and retain heat during the day and reradiate it at night, are responsible forthis phenomenon15,16 and may enhance heat vulnerability among city-dwelling infants. Past research has shown that low socio-economic position or ethnic/racial minority populations live in hotter sections of cities and are particularly heat vulnerable.4,15,17-19 There are a number of explanations for this enhanced vulnerability. Poor, racial/ethnic minorities often lack the resources, such as air conditioning or adequate housing, to protect themselves against heat.17 Also, because of the cooling properties of green space,20 any unequal distribution of vegetation may create microurban heat islands and contribute to disparities in heat vulnerability. Nevertheless, few studies have examined heterogeneity in infant mortality associated with temperature across strata of socioeconomic position or green space.

Philadelphia, Pennsylvania, is the sixth largest city in the United States.21 It has a humid, subtropical climate that is mild with no dry season. Over the past century, the city has experienced rising temperatures, and even hotter weather is projected for the future.22 Most of Philadelphia's neighborhoods contain multistory brick row homes and large amounts of impervious surface. Further, parts ofPhiladelphia are key examples ofthe urban heat island effect. For example, from 2003 to 2012, Philadelphia's city center experienced more very hot (‡ 32.2°C) or extremely hot (‡37.8°C) days than did its periphery.22 Philadelphia also has high infant mortality rates: in 2012, the infant mortality rate was nearly 2 times the US rate (10/1000, vs 6/1000).23,24

We describe results from a case-crossover analysis of associations between daily temperature and infant mortality in Philadelphia. In addition to quantifying overall effects of temperature, we investigated whether the effects differed according to several individual-and area-level characteristics.

METHODS

We conducted a time-stratified case- crossover analysis of associations between ambient temperature and infant mortality.25 We included all deaths that occurred among infants younger than 12 months in Philadelphia from 2000 through 2015. We restricted our analysis to the warm months of the year (May 1-September 30). This restriction was because we were interested in studying the effect of extremely hot temperatures only and based on past observations of a V- or J-shaped relationship between temperature and mortality,26 with higher rates of death during the hottest and coldest temperatures.

Mortality Data

We identified mortality cases using death certificate data from the Bureau of Health Statistics &Registries of the Pennsylvania Department of Health, Harrisburg, Pennsylvania. The mortality data included the date and age of death, the address at the time of death, maternal race/ethnicity, and infant sex. The Urban Health Collaborative at the Drexel University Dornsife School of Public Health used ArcGIS and address locators available from ESRI to geocode the home addresses of infants who died between 2000 and 2011. The Pennsylvania Department of Health assigned latitudes and longitudes to the home addresses of infants who died between 2012 and 2015, and the Urban Health Collaborative used ArcGIS to regeocode addresses not geocoded to street level. If the regeocoded addresses could be geocoded to street address or better, we used the regeocoded results. We assigned deaths that occurred from 2000 to 2008 to 2000 census tract boundaries, and those that occurred between 2009 and 2015 to 2010 boundaries.

Climate Data

We downloaded data on daily minimum, maximum, and mean dry bulb temperatures and relative humidity, as recorded by the weather monitor at the Philadelphia International Airport from the National Centers for Environmental Information Climate Data Online.27 We used the weathermetrics package in R28 version 3.4.0 (R Foundation for Statistical Computing, Vienna, Austria) to calculate the mean daily heat index, a metric that combines temperature and humidity and was developed to represent thermal comfort.28

Green Space Data

We considered overall greenness, percentage tree canopy, and percentage low vegetation as potential modifiers of

the association between temperature and infant mortality.

To represent overall greenness, we used normalized difference vegetation index (NDVI) images from the Moderate Resolution Imaging Spectroradiometer of NASA's Terra satellite (MOD13Q1, version 6 product).29 The NDVI is a quantitative measure of overall greenness density. It ranges in value from -1 to 1 and is based on the reflectance properties of vegetated versus nonvegetated areas. Healthy vegetation absorbs most visible light and reflects most near-infrared light, whereas nonvegetated areas reflects more visible light and less near-infrared light. Negative NDVI values represent water, values close to zero are areas without green (e.g., pavement in urban areas), and values close to 1 represent the most densely green areas. The Moderate Resolution Imaging Spectroradiometer provides 250-meter resolution images for 16-day periods, which we used to calculate the median NDVI value for every summer of years 2000 through 2015. To every infant, we assigned the median NDVI value for the summer months of the death year. We selected the summer months because they are the greenest. We investigated modification of associations between temperature and infant mortality by NDVI value for the 250-meter cell into which each infant's geocoded address fell.

We also used high-resolution orthophotography and Light Detection and Ranging- based land cover assessment data from years 2008 and 2013 to estimate amounts of tree canopy cover and low vegetation (grass and shrubs) near the infant's geocoded residential address.30 The 2008 land cover assessment assigned each 1-foot pixel to 1 of 7 mutually exclusive categories. The 2013 land cover assessment included 3 additional categories, which we collapsed into the same 7 used in 2008. Because the categories are mutually exclusive, they allow distinguishing trees from grass and shrubs. We considered percentage land cover by tree canopy or low vegetation (grass or shrubs) within 250-meter buffers of the infant's address at the time of death. For deaths that occurred between 2000 and 2010, we assigned land cover estimates from the year 2008. For deaths that occurred in between 2011 and 2015, we assigned land cover estimates from 2013.

Individual- and Area-Level Characteristics

We investigated the following census tract-level characteristics as effect modifiers of the overall associations: percentage living below the poverty line, percentage non-Hispanic Black, median year housing was constructed in the infant's residential census tract, and population density (used as an indicator of urbanicity). We considered the median year that housing was constructed to be an indicator of housing quality, with the hypothesis that older housing was less likely to have air conditioning or characteristics that would be heat protective, such as cool roofs. We derived tract-level estimates of all variables from the US Census Bureau's American Community Surveys (years 2005-2009, 2010-2014) and from the 2000 Decennial Census. We also investigated the following individual-level characteristics as potential effect modifiers: infant age at the time ofdeath (< 28 days vs ‡28 days, and< 7 days vs ‡7 days, where the 28- and 7-day categories were not mutually exclusive); maternal race/ethnicity (non-Hispanic Black, non-Hispanic White, Hispanic, and other); and place of death (inpatient: hospitalized inpatient, hospice facility, or pediatric long-term care facility vs outpatient: hospital or dead on arrival, home residence, or emergency department or outpatient). We derived information on age at death, maternal race/ ethnicity, and place of death from the death certificates.

Statistical Analysis

We used a case-crossover design to estimate the association between temperature or humidity with infant mortality. We identified every infant who died between May 1 and September 30 as a case, and we defined each date of death as a case day. We used a timestratified strategy to identify control days.25 We matched control to case days based on day of the week.31 For the primary analysis, we stratified time using month and year, which has been shown to be adequate for the majority of analyses.31 Thus, we defined days that fell within the same month and year as the case day and that occurred on the same day of the week as controls. For example, ifan infant died on a Tuesday in June 2005, then we compared the temperature on that day with the temperature on all other Tuesdays in June of 2005. A time-stratified case-crossover design is analogous to a highly stratified case-control study. In a case-control study, a person is eligible to serve as a control as long as they are at risk for experiencing the event. Thus, a person who is selected as a control can later serve as a case. Similarly, in the case-crossover design, case days are eligible

to be selected as control days.31
Because all cases serve as their own control, the design inherently controls for all time-invariant factors, such as race/ethnicity or sex. In addition, by selecting as control days the same day of the week and time strata as the case day, the analysis inherently adjusts for long-term time trends, seasonality, and day of the week.
To test the robustness of our results, we reran analyses using an alternate control-selection strategy. Specifically, we still matched control days on day ofthe week, but we defined the time strata as 21-day periods of every year, rather than month. This created strata with shorter time windows, which provided better control for seasonality, at the cost of reduced lower statistical efficiency because there were fewer comparison days.31
We used conditional logistic regression models to compare case to control days. Because it might be on the causal pathway between temperature and infant mortality, we did not adjust for air pollutants, such as ozone or particulate matter, in our models.32 Therefore, we interpreted our results as the total rather than the direct effect of temperature on mortality.33
We first estimated the associations between temperature and infant mortality by modeling all temperature metrics as continuous, using natural cubic splines with knots at the 25th and the 95th percentiles of the distribution for the relevant temperature metric. We selected these knot locations and degrees of freedom after exploring several alternatives; this parameterization provided the best fit to the data, based on deviance statistics. We explored relationships with all metrics on the case or control day (day 0) and for averaging periods of 0 to 1,0 to 2, and0 to 3 days preceding the date of death or the matched control day. We ran models with minimum, maximum, and average temperatures unadjusted and then adjusted for relative humidity (entered into models as a linear term). Because inclusion of relative humidity had little effect on the temperature estimates, we report results from models that did not include this as a covariate. We do, however, report results for mean daily relative humidity in additional to the temperature variables.
After comparing deviance statistics, we identified minimum daily temperatures on the day of the event as the most predictive temperature metric. We also observed a linear increase in the risk of infant mortality above the 95th percentile of the distribution of minimum daily temperature (23.9°C). We ran subsequent analyses with minimum temperature parameterized as a piecewise linear term, coded as zero for temperatures less than 23.9°C, and as minimum daily temperature minus 23.9°C, otherwise. This approach has been used in previous analyses that quantified associations of transient exposures, such as temperature or air pollution, with mortality, and is ideal for parameterizing the effect of an exposure for which there is a linear effect after a threshold value.34
We investigated modification ofthe effect of minimum daily temperature for lag 0 by including an interaction term between the piecewise linear term and each covariate. We explored each covariate as an effect modifier in a separate model. We parameterized poverty, race/ethnic composition, population density, and green space variables using 4-level categorical terms based on quartiles of the distribution. For housing construction year, we contrasted census tracts in which the median was 1941 or earlier with those in which the median was 1942 or after. Year 1942 was the median ofthe distribution of housing construction years in our data.
We evaluated the importance of each interaction term using likelihood ratio tests. We ensured that all models were nested by restricting the data to those with complete information for all potential effect modifiers.
We conducted all analyses using R version 3.4.0. We used the dlnm version 2.3.6 and survival packages to run the analyses.35
RESULTS
In Philadelphia, from May 1 through October 1 between 2000 and 2015, there were 1522 infant deaths. Most of the deaths occurred among infants younger than 28 days (72%; Table 1). More than half of the infants who died were male (57.6%), and more than 60% were born to non-Hispanic Black mothers (64.9%). Table 2 shows the distribution of the meteorological variables for the study period. The highest minimum and maximum temperatures were 28.3°C and 39.4°C, whereas the lowest maximum and minimum temperatures were and 0.0°C and 10.6°C.
Overall Relationships
Figure 1 shows relationships of infant mortality with all the temperature metrics on the day of the event (lag 0); this

lag was most predictive of infant mortality, based on examination deviance statistics. Figure 2 shows relationships with mean daily relative humidity (lag 0). Figures A, B, and C (available as a supplement to the online version of this article at http://www.ajph.org) show relationships with the other lags, for all metrics, and Table A (available as a supplement to the online version of this article at http:// www.ajph.org) presents the odds ratios (OR) and 95% confidence interval (CI) estimates for all metrics and lags explored that correspond to the log-odds estimates shown in the figures. We calculated the ORs shown in Table A using the minimum of each metric as the referent (Table 1).
Risk of infant mortality increased linearly in association with higher minimum daily temperatures above the 95th percentile ofthe overall distribution on the day ofinfant death (lag 0; Figure 1). ORs comparing 23.9°C or 26.1°C minimum temperature days (lag 0) with 4.4°C days (the lowest minimum daily temperature) were 2.1 (95% CI = 1.2, 3.6) and 2.6 (95% CI = 1.3, 5.0).
In models with minimum daily temperature parameterized as a piecewise linear term, risk of infant mortality increased by 22.4% (95% CI = 5.0%, 42.6%) for every 1°C increase in temperature above 23.9°F (Table B [available as a supplement to the online version of this article at http:// www.ajph.org]).
To test the sensitivity of our results to the control-selection strategy, we reran the primary analyses (spline models), using control days matched on day ofthe week and 21 data strata periods of each year. The shape of the relationships remained consistent with the primary results (Figure D [available as a supplement to the online version of this article at http://www.ajph.org]), and the effect sizes were similar, although moderately closer to the null, with slightly wider confidence intervals (Table C [available as a supplement to the online version of this article at http:// www.ajph.org]). For example, ORs comparing 23.9°C or 26.1°C minimum temperature days (lag 0) with 4.4°C days (the lowest minimum daily temperature) were 1.7 (95% CI = 0.9, 3.4) and 2.0 (95% CI = 0.9, 4.6) in the sensitivity analyses, versus 2.1 (95% CI = 1.2, 3.6) and 2.6 (95% CI = 1.3, 5.0) in the primary analysis.

Effect Modification

To explore effect modification by individual-and area-level covariates, we included an interaction term between each covariate and the piecewise linear term for minimum daily temperature on the day of death. Results from the 12 individual models in which we explored effect modification are given in Table B. Overall, we did not observe evidence of effect modification by the covariates that we examined, including age at death, place of death (outpatient vs inpatient), maternal race/ethnicity, or percentages of the residential census tract living below the poverty line (Table C). Although we observed higher risk of mortality in association with high minimum daily temperatures among infants with the most tree canopy within 250 meters of their home and among infants living in census tracts with the highest population density (for likelihood ratio tests, P = .06 and P = .08, respectively), we did not observe a consistent dose-response relationship across categories of either measure.

DISCUSSION

In Philadelphia, between 2000 and 2015, we observed a higher risk of infant mortality in association with higher daily temperatures. This analysis contributes to mounting evidence that infants are a subpopulation that is vulnerable to the adverse health impacts of climate change.36
The finding ofa higher risk ofmortality in association with higher ambient temperatures is consistent with past research.37,11 Several studies have observed an association between heat and sudden infant death syndrome, in particular.10,13 Thermal stress has been postulated as a contributing factor to sudden infant death syndrome and may contribute directly via hyperthermia or by disrupting respiration of the laryngeal closure.38 More generally, children and infants are heat vulnerable because of their immature physiological systems. Compared with adults, when they engage in passive exercise in the presence of high temperatures, they have a lower cardiac output, lower whole-body sweating rate, and higher increases in core body temperature.39 Because of their small total body surface area, they also have a larger surface area with which to absorb heat. Further, because of their newness to the world, they have had little opportunity for heat acclimatization (i.e., to develop beneficial adaptive responses, such as reduced cardiovascular strain and a lower threshold for sweating).39
We investigated associations of infant mortality with daily mean, maximum, and minimum temperatures and with the mean daily heat index. Of all metrics we explored, daily minimum temperature was most predictive. Because

minimum temperatures generally correspond to nighttime temperatures,40 this suggests that extreme nighttime heat is particularly dangerous to infants. This result is consistent with the thinking that heat is most dangerous for urban residents because of the heat island effect.16 During the night, the large amounts of pavement make urban areas less able to release absorbed heat compared with surrounding suburban and rural areas. Past temperature and mortality studies have found nighttime temperatures to be particularly dangerous.40

To our knowledge, this is the first analysis to investigate green space and other area-level characteristics as modifiers of the association between temperature and infant mortality. We saw little evidence of effect modification by most of the variables we explored. Our analyses were limited by the relatively small sample size, which led to imprecise and unstable effect estimates. Further analyses with larger data sets are needed to further explore effect modification by the vulnerability factors that we explored.

There were also too few cases to explore associations with specific causes ofdeath, such as sudden infant death syndrome. This is an important area for future research, particularly because such an investigation would help to elucidate the mechanisms by which temperature affects infant vulnerability. Another limitation was our inability to explore individual-level socioeconomic position, birthweight or gestational age as effect modifiers. Additionally, we investigated associations with outdoor, rather than indoor, ambient temperatures. , Because we did not include air pollutants in our models, we were unable to determine the extent to which the observed associations were attributable to these exposures. Although they were of extremely high spatial resolution and allowed us to distinguish type ofland cover, the data from which we derived measures of tree canopy and grass and shrub were from years 2008 and 2013 only; we estimated land cover for other years based on these 2 time points. Therefore, these estimates may be subject to misclassification-particularly for infants who died in the early years of the study period.

Strengths ofour analysis include the use of a case-crossover study design, which inherently adjusts for all time-invariant confounders. Our results were relatively unaffected by an alternate control-selection strategy, which offered even tighter control for seasonality. We considered several individual-and area-level covariates as potential effect modifiers, which is an important contribution to the body ofliterature in this field. Further, we used point-level, geocoded residential addresses to assign and explore the modifying effect of green space.

Results from this work suggest that high temperatures are an important concern for infants. Additional research on this topic, with larger data sets and across different geographic regions, is critically needed to confirm these findings. This area of research has important implications for heat-response plans and urban-planning decisions, especially as we face the promise of an increasingly warm planet.

CONTRIBUTORS

L. H. Schinasi designed the study, conducted the analyses, and led the article writing. J. R. Bloch and A.J. De Roos contributed to study design and data interpretation. S. Melly contributed to data preparation, including address geocoding. Y. Zhao and K. Moore contributed to data preparation. All of the authors contributed to article writing

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CONFLICTS OF INTEREST

The authors have no conflicts of interest to declare.

HUMAN PARTICIPANT PROTECTION

This project was approved by Drexel University's institutional review board (protocol no. 1604004464).

Sidebar

ABOUT THE AUTHORS

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DETAILS

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Electric Scooters: Case Reports Indicate a Growing Public Health Concern

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ABSTRACT (ENGLISH)

With the introduction of rideshare electric "dockless" scooters in 2017 by Bird Rides, Inc, a new type of affordable transportation became available to the public. Often seen along the sidewalks and street corners of downtown metropolitan areas, these devices are strategically designed for the heavily congested, urban population centers. Patrons download an application on their smartphone, enterbilling information, and then link the account to any available electric scooter. Although commercially available models exist with a top speed of 50 miles per hour and a range of 75 miles, electric scooters from Bird and Lime travel at a top speed of 15 miles per hour and have a range between 15 and 20 miles. On completion, the rider leaves the scooter along the sidewalk, where it waits for the next interested patron. Some of the appealing aspects of these devices include low cost, ease of accessibility, and the ability to bypass the often standstill traffic conditions by using the bike lanes, surface street, and sidewalk. Over the past two years, market demand has grown, with multiple companies (e.g., Bird, Lime, Spin, Uber, and Lyft) entering the industry. Electric scooters and their derivative will become a $42 billion industry by 2030. However, in parallel with their growing popularity has been an awareness of their safety hazards. Reports across the United States cite various types of injuries, from skin abrasions and ankle sprains to major injuries including open fractures, traumatic brain injuries, and even death.

FULL TEXT

With the introduction of rideshare electric "dockless" scooters in 2017 by Bird Rides, Inc, a new type of affordable transportation became available to the public. Often seen along the sidewalks and street corners of downtown metropolitan areas, these devices are strategically designed for the heavily congested, urban population centers. Patrons download an application on their smartphone, enterbilling information, and then link the account to any available electric scooter. Although commercially available models exist with a top speed of 50 miles per hour and a range of 75 miles, electric scooters from Bird and Lime travel at a top speed of 15 miles per hour and have a range between 15 and 20 miles. On completion, the rider leaves the scooter along the sidewalk, where it waits for the next interested patron. Some of the appealing aspects ofthese devices include low cost, ease of accessibility, and the ability to bypass the often standstill traffic conditions by using the bike lanes, surface street, and sidewalk.

Over the past two years, market demand has grown, with multiple companies (e.g., Bird, Lime, Spin, Uber, and Lyft) entering the industry. Electric scooters and their derivative will become a $42 billion industry by 2030.1 However, in parallel with their growing popularity has been an awareness of their safety hazards. Reports across the United States cite various types of injuries, from skin abrasions and ankle sprains to major injuries including open fractures, traumatic brain injuries, and even death.2-4

RECENT CATASTROPHIC INJURIES

Cedars-Sinai serves a large trauma catchment area in west Los Angeles, California, which represents ground zero for the introduction of electric scooters partly because of the high pedestrian traffic, tourist activity, and surrounding universities.5 Almost overnight, we experienced a significant rise in trauma activations and hospital admissions attributed to electric scooters. In 2018, the total number of trauma activations related to electric scooters at Cedars-Sinai was 30; in 2019, we will receive approximately 100. By comparison, Los Angeles County General Hospital, the largest trauma center in Los Angeles County, had zero electric scooter-related trauma activations in 2018, whereas

the 2019 estimate is 300.

Recently, two patients were admitted to our institution after catastrophic electric scooterrelated collisions. One patient was an otherwise healthy 23-yearold man who was riding a scooter when he was struck by a motor vehicle, which sent him flying approximately 20 feet. On arrival to Cedars-Sinai, the patient went into a pulseless rhythm, and we initiated chest compressions. Despite our best efforts, he was declared dead soon after arrival. This patient marks the ninth known death linked with electric scooter use that has been cited across the United States.4

Less than a few weeks after this death, another patient experienced a severe traumatic brain injury after being struck by an electric scooter while in a crosswalk. This 75-year-old gentleman had numerous skull fractures with multiple intracranial hemorrhages and large-territory infarcts. After one month in the neurology intensive care unit, he showed little recovery and was eventually transferred to a longterm-care facility, flaccid in all extremities.

Our experience serves as a warning regarding the public health safety ramifications associated with the use of these devices. In particular, our second case shows that not only riders are at risk for severe injury, which constitute most ofthe emergency department admissions (92%98%), but also pedestrians.2,3 The combination of mass and force from an electric scooter rider can be lethal. Pedestrian injuries after collisions with electric scooters will likely increase as the industry continues to expand and the space on sidewalks becomes increasingly congested with scooters.

POLICY AND ACTION

Multiple cities have enacted laws to try to curb the associated dangers. In Atlanta, Georgia, scooters were banned at night; Nashville, Tennessee, weighed banning their use; and Santa Monica, California, filed a lawsuit against one of the companies. In a comprehensive effort, Los Angeles and other cities released a Vision Zero strategic plan to reduce all traffic-related deaths by 2025. The Vision Zero plan includes traffic safety protocols on how to reduce injuries related to emerging mobility devices such as electric scooters. Although no easy solution exists to reduce all hazards associated with electric scooters, safety standards are necessary and feasible to achieve zero deaths related to their use.

A fruitful discussion on this topic must place the use ofthese devices within the greater context of other transportation devices. In a theoretical sense, no transportation device is without risk. Motor vehicles, which represent the most commonly used means of transit, still constitute the vast majority of emergency department traumas, with an estimated 89 related deaths per day in the United States.6 Bicyclists andjoggers are the source ofnumerous hospital admissions and deaths reported each year.7 However, these types of travel are far more ingrained in our society and less likely to fall under scrutiny than the recently introduced electric scooters. We must recognize that without an objective comparison ofridermiles or ride hours to the number of severe injuries incurred from other types of transportation in urban areas, the attributable relative risk of scooters cannot be fully described. As such, it is important to be cautionary of any major, knee-jerk responses.

With that said, however, our anecdotal experience and the growing concern for the safety of these devices require lawmakers and stakeholders to take policy steps to prevent injuries from occurring. Outright banning electric scooters would represent the most extreme form of action and would be premature until clear evidence exists that these devices represent a greater danger than other types of transportation. A ban would not only deter innovation and ingenuity but also fail to allow new innovations to address these, and future, safety hazards.

FUTURE DIRECTIONS

Our experience suggests that several thoughtful, targeted interventions may be necessary. Because helmet use is limited while riding electric scooters, newer, more portable helmet designs may lead to increased use. Many riders describe injuries during their first electric scooter ride related to their unexpected speed, which suggests that initial rides should have a limit to the acceleration and top speed. Other riders stated that their injuries occurred while holding a bag or phone, which indicates the need for a cage to hold these items. Potholes or other road hazards that led to a crash suggest that improvements in the electric scooter shocks may reduce injuries.

One important characteristic worth stressing is how silent electric scooters are. Additionally, they are typically dark in color and do not have the high-powered lights or reflectors required by cars and motorcycles. This combination

makes scooters particularly prone to collisions with pedestrians. Simple interventions such as a noise alerting sound and additional lights or reflectors could lead to a reduction in scooter versus pedestrian injuries. Dedicated paths that separate electric scooters from both pedestrians and automobiles also would provide significant protection to both riders and pedestrians.

Given the projected growth of the electric scooter industry, we predict that the injury burden from these devices will exceed other pedestrian- or bicycle-related trauma and be second only to automobile collisions in related mortality. Targeting zero deaths is an achievable goal, and further discussion on how best to address this growing public health concern is necessary. /4JPI-l

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CONTRIBUTORS

All of the authors contributed equally to this editorial.

CONFLICTS OF INTEREST

The authors have no conflicts of interest to disclose.

Sidebar

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DETAILS

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11 Years Ago/140 Years Ago (16 Years in AJPH)

Anonymous

FULL TEXT

Women, Pleasure, and Condom Use

Women in this study were... resistant to the physicality of male condoms than were Women men. Women spoke consistently of the physical and esthetic detractions of condoms.... Our findings add a physical, sensational layer to previous research, which has focused primarily on the symbolicand emotional aspects of women's resistance to condoms. As such, this study highlights a perplexing gender paradox of condom promotion efforts: women are concerned with men's pleasure, and they often dislike how condoms feel, yet heterosexual women remain the targets of condom promotion campaigns more so than do heterosexual men.

From AJPH, October 2008, p. 1810

140 Years Ago (16 Years in AJPH)

Bicycling for Pleasure and Power

The fact that women took to the bicycle with great enthusiasm generated decidedly mixed responses. [Some] argued that bicycling was the best single exercise for strengthening the pelvis and promoting healthy childbearing. Others feared that women enamored of their bicycles would rejectchildbearingaltogether.Theyworried that women bicyclists were casting aside their corsets and high heels in favor of various forms of more natural dress- from relatively modest split skirts to "unfeminine" knickerbockers or bloomertype outfits. But the new women bicyclists were not to be deterred.... "[T]he bicycle supplies ...a new pleasure-the pleasure of going where one wills, because one wills "

From AJPH, September 2003, p. 1409

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Most Americans Face a Grim Old Age-and Disadvantaged Groups Have It Worse

Auerbach, John, MBA [1] ; Lynn, Joanne, MD [1] Trust for America's Health in Washington, DC

ABSTRACT (ENGLISH)

Golden Years? Social Inequality in Later Life by Deborah Carr is reviewed.

FULL TEXT

Most Americans Face a Grim Old Age-and Disadvantaged Groups Have It Worse

The number of older adults living with frailty and disability will nearly double between 2012 and the 2030s,1 creating serious challenges in the United States because it has not yet taken the opportunity to prepare. The country has thoroughly inadequate financing, seriously maladapted medical care practices, and unreliable social services. Most

of the economic disruption, widespread suffering, and societal despair that awaits us could be averted, but doing so requires acting now, especially given the dire circumstances facing older adults who are poor or who face discrimination on the basis of their gender, income, race, ethnicity, geography, sexual orientation, or gender identity. At this critical moment, the perspectives and tools of public health could be very useful.

Deborah Carr's remarkable new book, Golden Years? Social Inequality in Later Life, makes what is at stake abundantly clear. In a cogent and readable style, Carr manages to review hundreds of studies about the challenges of achieving one's optimal health and well-being when one is aged older than 65 years. At the heart of this comprehensive opus is an insightful and acutely sensitive understanding ofthe barriers that arise from the social inequalities faced by hundreds of millions of Americans, which accumulate over a lifetime. As she says in her introduction: "Oldage intensifies the indignities of disadvantage, just as disadvantage amplifies the indignities of aging" (p. 8). To her credit, she elucidates the difficulties that most Americans face, and she delves deeply into what happens as a result of these very specific disadvantages.

UNEQUAL HEALTH DUE TO DETERMINANTS

While all older adults face certain challenges related to aging, Carr makes clear that this enormous and rapidly growing population is not easily lumped together into a category of "the elderly." In great detail, she disaggregates the data from an astounding array of governmental, clinical, and academic surveys and studies and from experts in the field to identify subpopulations by health status, race and ethnicity, gender, income, educational level, work history, geography, marital status, and living arrangements. She pointedly describes how and why each of these categories matters.

For instance, she traces how negative experiences beginning in childhood often have an impact that lasts a lifetime. She describes the seriously adverse effects that earlier educational and employment barriers to opportunity, housing discrimination and redlining, and continual experiences of racism have had on the health of older Black Americans. Similarly, she applies a deep analysis of the poorer health of older women that results from discriminatory employment practices, their role as caretakers of the young and old, and of Social Security policies based on outdated gender roles such as those that favor married women over those who have never married. She documents these examples by citing many confirmatory studies and data.

THE ROLE OF THE PUBLIC HEALTH SECTOR

This book should be read by many people in public health, a field that has largely ignored the overall health and well-being of older adults. While older adults may benefit from influenza vaccine campaigns, diabetes prevention, and occasional falls prevention programs, there are no Centers for Disease Control and Prevention grants to state and local public health agencies to support healthy aging. Master's programs in schools of public health do not address the rapidly emerging serious challenges of having large numbers of elderly people living with self-care disabilities, many of whom are socially isolated and have thoroughly inadequate finances. This population experiences a miserly safety net that often results in years-long waits for home-delivered food and, for some, forced admission to nursing facilities. The public health sector, with its tools of epidemiology, evidence-based preventive interventions, and commitment to the public's well-being, is well-suited to engage these issues effectively. The urgency imposed by the rapidly increasing numbers offrail and disabled elders makes it important to take up this cause now.

As Carr makes clear, however, the well-being of older adults with significant disabilities and frailty depends less upon existing public health programs that focus on changing individual behaviors than on improving housing stock, a larger personal care workforce, flexibility of employers regarding caregiving, adequate transportation arrangements, and greater availability of food delivery to homes. Professionals in health care and social services increasingly screen older adults for evidence of the effects of social determinants of health. But, once identified, people need help to address them. No physician or nurse clinician or social worker can guarantee affordable housing when none is available nor supply supplemental food when the Supplemental Nutrition Assistance Program is insufficient or not a possibility. As Carr points out, these inadequacies frequently result in preventable illnesses and injuries or premature death among older adults.

Efforts have begun to engage public health professionals in providing more support for frail elders. With support from The John A. Hartford Foundation, for instance, state and local public health officials in Florida piloted an age-friendly public health approach with promising results.2 Similarly, the Office of the US Assistant Secretary for Health is convening five regional meetings with those in the public health, health care, philanthropic, and elder services sectors to draw attention to the need and encourage action.

A CALL TO ACTION

Carr would probably applaud these initiatives but add that more is needed, and quickly. She ends her book with a discussion of policies and practices that would make a positive difference. While she is often skeptical of governmental policymakers' willingness to tackle the problems, she identifies existing government funding that could be expanded. She also urges the medical profession to increase the number of clinicians with skills in treating and caring for geriatric patients. Her principal goal, though, is to persuade society to address the structural causes preventing many Americans from having a comfortable old age- especially poverty, discrimination, and gender inequality.

Her work also presents a major challenge to the public health sector to utilize its formidable record of success. Public health professionals and their organizations could generate and disseminate data that document the experience of frail and disabled elders and their families and could lead in establishing policies and practices that would use those data to guide improvement activities. Public health professionals could also adapt ongoing public health activities, such as planning for emergencies, to frail elders and could help focus policymaker and media attention on the urgency of planning for rapid demographic change, including more and better targeted financing for health care and social services. Public health practitioners should do this because not doing so would leave many people without essential life supports in old age. Carr's book provides an unblinking picture of the painful and urgent need for action by public health professionals and their allies.

Sidebar

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CONFLICTS OF INTEREST

Neither author has any conflict ofinterest.

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DETAILS

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Addressing Health Disparities Through Deliberative Methods: Citizens' Panels for Health Equity

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ABSTRACT (ENGLISH)

Health disparities adversely affect millions of people living in disadvantaged communities, resisting public health interventions that do not address the specific conditions, driving forces, or health problems in these communities. Drawing from the underutilized science of deliberative methods, we introduce the innovative citizens' panels for health equity approach-a novel methodology that engages public expertise and knowledge of community health needs, risks, and priorities to tailor public health research and interventions for greater relevance and impact on disadvantaged communities. By engaging affected residents and stakeholders in informed deliberation and decision-making aboutcommunity health disparities, citizens' panels provide important guidance for (1) designing research studies to target the major health disparities affecting disadvantaged communities and (2) tailoring evidence-based interventions to the perspectives, practices, and preferences of disadvantaged residents. Employed as the primary methodology in 2 federally funded projects conducted in California and Arkansas between 2017 and 2019, citizens' panels offer a systematic method for obtaining rich community insight into health disparities, shaping community-informed solutions, and affording disadvantaged communities influence over public health decision-making to stimulate grassroots change and health equity. (Am J Public Health. 2020;110:166173. doi:10.2105/AJPH.2019.305450)

FULL TEXT

Headnote

Health disparities adversely affect millions of people living in disadvantaged communities, resisting public health interventions that do not address the specific conditions, driving forces, or health problems in these communities. Drawing from the underutilized science of deliberative methods, we introduce the innovative citizens' panels for health equity approach-a novel methodology that engages public expertise and knowledge of community health needs, risks, and priorities to tailor public health research and interventions for greater relevance and impact on disadvantaged communities.

By engaging affected residents and stakeholders in informed deliberation and decision-making aboutcommunity health disparities, citizens' panels provide important guidance for (1) designing research studies to target the major health disparities affecting disadvantaged communities and (2) tailoring evidence-based interventions to the

perspectives, practices, and preferences of disadvantaged residents.

Employed as the primary methodology in 2 federally funded projects conducted in California and Arkansas between 2017 and 2019, citizens' panels offer a systematic method for obtaining rich community insight into health disparities, shaping community-informed solutions, and affording disadvantaged communities influence over public health decision-making to stimulate grassroots change and health equity. (Am J Public Health. 2020;110:166173. doi:10.2105/AJPH.2019.305450)

Eradicating health disparities is essential to achieving national health equity.1 Defined as group differences in health status resulting from social, economic, or environmental disadvantage,1 health disparities are the concrete manifestation of detrimental social factors such as racism, discrimination, and stigma that segregate individuals into disadvantaged communities laden with risk factors in the social and built environment (e.g., poverty, violence, toxic exposure). Living in these disadvantaged communities, residents are systematically denied access to health-protective resources (e.g., money, social capital, health care),2 preventing them from engaging in healthy personal behaviors while increasing their exposure to disease-causing stressors.3

As the underlying causal factors (e.g., economic inequalities, discrimination, inadequate health care, differential environmental exposures) of health disparities are community specific, varying on the basis of each disadvantaged community's unique problems and conditions,3 efforts to eliminate health disparities using conventional public health interventions-which are not tailored to the health disparity- related perspectives, needs, and interests of disadvantaged communities-generally produce marginal long-term results.4 Consequently, eliminating health disparities requires tailoring conventional research and intervention models for increased relevance and effectiveness in disadvantaged communities.

Aligning with the National Institutes of Health's emphasis on engaging communities in all research phases,5 this essay introduces citizens' panels for health equity, a novel community-based participatory research (CBPR)-oriented methodology for engaging lay members of disadvantaged communities in tailoring public health research and interventions to reduce health disparities. Rooted in the notion that community health is enhanced through community insight and engagement, citizens' panels systematically engage residents and stakeholders in disadvantaged communities in informed deliberation to obtain collective reasoning and decisions on public health research and interventions. Through public consultation, citizens' panels allow health professionals to benefit from the local knowledge6 and interests of community members affected by disparities in executing their CBPR work.

THE FOUNDATION OF CITIZENS' PANELS

Grounding the methodology of our citizens' panels is the idea that persons affected by health disparities should be consulted in resolving those disparities. Supported by the World Health Organization's principle of public participation in health,7 which holds that people have a fundamental right to participate in planning and implementing programs that affect their health,8 our method posits that research and interventions informed by public consultation will be better positioned to effect health change in disadvantaged communities. The concrete methods for performing citizens' panels are derived from the established literature on deliberative democracy and deliberative methods, and the panels' core principles are drawn from CBPR9 (box on page 167).

Deliberative democracy is a public policy tool that seeks to elicit citizens' values and priorities to inform decision-making on complex, values-laden issues by (1)gathering members of the public in a forum or structured setting; (2) presenting information and arguments from multiple sides of the target issue or policy to increase members' understanding of the issue and available policy options; (3) allowing members to collectively discuss the information, options, and conflicting group perspectives or opinions; and (4) obtaining public comments and recommendations to determine the most appropriate policy options.10,11

By facilitating direct dialogue and mutual information exchange between the public and officials-who stand to benefit from hearing the perspectives and judgments of informed citizens affected by proposed policies10- deliberative democracy seeks to increase understanding between the parties while bringing the diverse opinions and interests of the lay public into the policy process.11 When deliberative democracy is used to generate public-informed policy solutions to health-related issues, this approach is sometimes called deliberative methods.12

In deliberative methods, community stakeholders provide carefully reasoned input on the associated public values and beliefs, benefits and tradeoffs, and acceptance and resistance to various health issues. To date, much of this work has involved health care decision-making,12 14 as public perceptions and preferences can be informative for shaping effective health care practices.15 Deliberative methods can also have direct positive effects on participants, leading to high-quality engagement and discourse and significant changes in participants' knowledge and attitudes.13 Other reported uses of deliberative methods include obtaining public opinions on health issues as diverse as personalized medicine,16 human tissue biobanking,17 environmental problems,10 and informed consent for research.18 Deliberative methods' success in shaping complex health policies through public consultation14 led us to model our CBPR-oriented health equity methodology on the deliberative methods known as citizens' panels or citizens' juries.10,12

Intended for engaging disadvantaged communities in public health decision-making, citizens' panels for health equity introduce a new methodology to the science of CBPR. Broadly defined as a research orientation involving academic and community partnership undergirded by core principles of social justice, colearning, local relevance, mutual benefit, and long-term commitment, CBPR encompasses myriad research methods that infuse community participation and control, local decisionmaking, and community practices into health research.19

To create our systematic methodology for enhancing CBPR-oriented health disparities research and interventions via deliberative methods,20 we designed citizens' panels to reflect CBPR's 10 core principles.9 To clearly outline how citizens' panels reflect CBPR's principles, their mutual principles are briefly described in the box on page 167 and explained in richer detail in Table A (available as a supplement to the online version of this article at http://www.ajph.org). As the ultimate aim of CBPR is to redistribute resources and power to advance health equity,8,19 citizen's panels-which redistribute decision-making power to disadvantaged communities- may contribute to the growing list of methods for conducting CBPR.

Presently, deliberative methods are used for policy planning and priority-setting in multiple disciplines, including public health,12 14,21 but are less commonly used to inform CBPR-oriented research and practice. We will address this gap by presenting citizens' panels for health equity, supported by 2 case examples from federally funded CBPR projects: one targeting sexual minority patients aging with HIV and the other targeting Pacific Islanders experiencing mental health challenges.

CITIZENS' PANELS FOR HEALTH EQUITY

Citizens' panels are designed to capitalize on lay participants' grounded knowledge of their communities' conditions, practices, and health disparities to (1) gain rich research data that may yield a deeper understanding of community health disparities than conventional methods (e.g., surveys, focus groups) and (2) tailor research studies and interventions for greater community relevance and effectiveness. During citizens' panels, 15 to 30 community members convene to deliberate and render consensus decisions on a specified health disparity topic by (1) listening to a detailed presentation about the topic (or subtopics), (2) splitting into breakout groups (5-10 persons each) to discuss the options presented and achieve consensus, and (3) reconvening, sharing deliberations, and reaching a final panel-wide consensus.

For example, a health professional seeking to reduce community violence might choose to convene 15 participants from 3 community stakeholder groups (e.g., 5 residents, 5 law enforcement officers, 5 public officials). Participants would receive brief presentations detailing several evidence-based strategies for reducing community violence (e.g., crime hotspot policing, gang prevention strategies). Participants would then break out into small groups (each composed of a different stakeholder group) and deliberate about the perceived pros and cons of the presented strategies, and how to tailor them for the community (drawing from each group's differing perspectives, roles, and experiences). The groups would then separately rank each strategy on the basis of key criteria (e.g., feasibility, effectiveness) before reconvening as a panel to share their rankings and reasonings. Lastly, all participants would deliberate and vote to reach a final panel ranking. Using the top panel-ranked strategies, a community-tailored intervention to reduce community violence could be designed and implemented.

Before conducting the panels, information must be gathered for panel deliberation, often by consulting prior literature

(e.g., identifying existing evidencebased strategies) or using conventional data collection methods (e.g., surveys, interviews). In the example in the previous paragraph, the health professional could conduct focus groups with residents to identify the local factors driving community violence (e.g., inadequate community policing, strong gang presence), then review the literature to select evidence-based strategies addressing these factors for panel deliberation.

PROTOCOL FOR CITIZENS' PANELS

To design and implement citizens' panels for health disparities, 5 steps are prescribed:

1. identify community partner;
2. establish community sample and recruitment plan;
3. identify decisions requiring community input;
4. prepare content for panel deliberation; and
5. facilitate citizens' panels.

Identify Community Partner

To recruit participants from diverse backgrounds, researchers should develop meaningful community relationships.5 Accordingly, professionals may wish to engage a community partner(e.g., health organization, health department) to (1) establish study credibility and community trust and (2) recruit a broad range of community members or stakeholders as participants. These partners may also act as study "sponsors": entities responsible for acting upon panel recommendations10,22 in subsequent research and interventions. Having community partners increases the likelihood that designated recommendations will be followed, thus maintaining community interest, motivation, and trust.

Establish Community Sample and Recruitment

When researchers select participants, the sample should represent the broad range of individuals affected by the target disparity rather than a particular subgroup or interest.23 Obtaining a diverse, representative sample (1) improves the quality of deliberation, (2) promotes information saturation, and (3) reduces group-think and homogeneity of panel decisions.24 The more representative the panels are of the target community, the more productive the deliberations and legitimate the decisions will appear to community partners, sponsors, and the target public.23,24

To ensure a representative sample, professionals and partners must collectively define the boundary for who should be included,20 taking care not to draw the boundary so narrowly that important stakeholder perspectives are excluded, or so widely as to make recruitment and deliberation infeasible.20 Community partners are vital in selecting this optimal boundary, as they can identify stakeholders affected by the target disparity who might otherwise be overlooked.

Recruitment may also be performed through community partners, a best practice for recruiting hard-to-reach populations.25 Because of their innate community access and credibility, community partners may recruit participants from communitybased organizations, recreational spaces, and other settings that professionals have difficulty accessing. Stratified sampling26 is recommended to ensure sample representativeness, as it allows professionals to strategically capture the perspectives and decisions of diverse community members, especially those from smaller groups (e.g., health providers, public officials) that random sampling could miss.10

Specify Research Decisions

After selecting the target sample and recruitment strategy, researchers should specify the decisions requiring panel insight. Decisions will generally fall into 2 categories: (1) designing future research and (2) tailoring interventions. The first category utilizes citizens' panels to design studies that are germane to, and supported by, the target community. This may include consulting residents to determine the most urgent community health disparity to target (e.g., tobacco use vs obesity), specific studies to conduct (e.g., adult tobacco cessation vs youth tobacco prevention), or best tools for investigating the target disparity (e.g., surveys, interviews).

The second category utilizes citizens' panels to tailor intervention strategies for community feasibility, acceptability, and effectiveness. Many disadvantaged individuals possess worldviews that do not match prevailing public health

models ofillness and disease. For instance, spirituality and religion greatly influence health and illness behaviors in many minority communities (e.g., Latino/a, African American), yet they are largely absent from conventional interventions,27 thus limiting their effectiveness with certain populations.28 Citizens' panels capitalize on community members' grounded knowledge to tailor evidence-based intervention strategies to complement the worldviews and practices of disadvantaged communities. This may include using public input to tailor a single evidence-based intervention, tailoring multiple community-informed strategies from several interventions, or designing an intervention from the "ground up" for the target community.28

Prepare Content for Deliberation

Once the research decisions are specified, the presented content for participant deliberation can be designed (with input from community partners and advisors), focusing on increasing participants' knowledge and awareness of the target disparity and potential options and solutions. The content must be accurate, meaningful, and presented without being overly complex or patronizing.10 In designing and framing presentation content, professionals should note that its nature and delivery can affect deliberation quality, necessitating a careful weighing of the methodological tradeoffs between rigor (e.g., presenting all available disparity-related information and perspectives) versus costs (e.g., time, resources, waning participant energy or attention). For instance, to avoid overtaxing participants in a 1-hour panel session targeting youth substance use, the first 15 minutes could be dedicated to presenting community-specific settings where youth substance use is known to occur (e.g., local park, vacant lot, liquor store), followed by 15 minutes ofbreakout group deliberation and ranking of settings (e.g., local park ranked as top youth substance use setting) and 15 minutes of panel deliberation and final consensus ranking.

Facilitate Panels

At the start of the panels, facilitators should create a motivating and safe environment by establishing clear roles, rules, and norms to minimize participant anxiety and encourage deliberation.24 This includes detailing the purpose, format, and consequences of the panels,24 and the need to listen respectfully to other participants' perspectives and opinions.

During deliberation, facilitators should be cognizant that different stakeholders may hold different boundaries ofconcern20 (e.g., community leaders may be narrowly concerned with youth substance use at schools, whereas other participants may be concerned with wider community settings) that could manifest in conflict and marginalization (e.g., community leaders marginalizing competing opinions during decision-making). More broadly, facilitators must be attentive to dynamics and differentials of power and control between themselves and participants during discussions, taking care to understand the group's interests in setting the agenda, letting participants lead the discourse in desired directions, and allowing final decisions to be determined through panel consensus.

To reach consensus decisions, after the full panel reconvenes and deliberates, facilitators should hold an initial voting (e.g., handraising) to identify the panel's top choice. Ifmultiple top choices are identified, facilitators should invite participants to discuss their reasonings for or against the top choices, and guide deliberations toward negotiation and compromise (e.g., A will be the consensus top choice but B will also be highlighted in reports and communications) until participants achieve consensus via unanimity or overwhelming majority.

Role of Professionals

When designing and implementing citizens' panels, professionals and community partners should collaborate at each step. Community partners are critical in providing the necessary community and cultural expertise, whereas professionals provide the scientific expertise, evidence, and training in panel and evaluation methods (e.g., facilitating panels, conducting pre- post panel surveys). Professionals may also identify and then work with partners to procure funding from outside entities.

As funders, these entities may at times condition funding on the use of standardized instruments or measures or evidence-based interventions that may not ideally fit the community, and they may have specific expectations of outcomes and products (e.g., scientific papers, evidence-based intervention strategies). Therefore, 1 role of professionals is to review with partners the funder's conditions, justifications (e.g., increased scientific rigor), and desired outcomes or products to find common ground. Then, using partner feedback, professionals should negotiate

with funders necessary mutually acceptable alternatives such as using culturally adapted or translated surveys, or interventions consistent with community values and practices.

CASE EXAMPLES OF CITIZENS' PANELS

The following examples from 2 federally funded projects are provided to highlight the use of citizens' panels to shape health disparities research and interventions, respectively.

Sexual Minority Adults Aging With HIV

Approximately 50% of adults living with HIV are aged 50 years or older.29 Although HIV substantially heightens risk for medical comorbidities (e.g., diabetes, cardiovascular disease, cancer),30,31 scant research has examined health disparities among older adults aging with HIV. Funded by the Patient-Centered Outcomes Research Institute, we conducted citizens' panels (Figure 1) to determine the direction of disparities research with sexual minority adults aging with HIV (‡ 50 years) in Palm Springs, California, a community containing the nation's highest prevalence of gay men with HIV (12 times the national average).32 We anticipated that this disadvantaged community would experience numerous health disparities (e.g., depression, dementia, mortality) stemming from the compound effects of long-term HIV infection, aging, trauma, and stigma-related minority stress.

For the first step, we partnered with the HIV &Aging Research Project-Palm Springs (HARPPS), a community-based coalition of patients aging with HIV, community advocates, and health care providers. In the second step, HARP-PS identified 5 stakeholder groups central to understanding community health disparities:

1. patients aging with HIV,
2. patient caregivers,
3. HIV providers,
4. HIV researchers, and
5. HIV organization staff.

Respondent-driven stratified sampling was used, with HARP-PS staff recruiting participants from the 5 stakeholder groups. To specify the panel decisions, the research team and HARP-PS collectively decided the panels would rank potential research studies addressing 3 health disparities of major community concern: (1) chronic inflammation, (2) impaired cognitive function, and (3) depression and social isolation. To identify these 3 disparities and our potential study options for panel deliberation, focus groups were conducted with 46 participants from the 5 stakeholder groups33 and a symposium was held in which HIV researchers were invited to present their studies targeting these disparities. From this information, panel presentations were developed.

Twenty-six participants participated in the citizens' panels. The panels consisted of three 1-hour panel sessions focused on a different health disparity (e.g., chronic inflammation), with presentations informing participants about each disparity's health impact on patients aging with HIV (e.g., chronic inflammation contributes to aging-related comorbidities) and 3 potential study options for addressing each disparity (Figure 1). The outcomes of the panels were a ranking of studies for community implementation. During the panel, diverse opinions were shared, with minimal group conflict emerging, in part because each participant ascribed strong importance and commitment at the start of the panels to the collective goals of(1) defining the scope of future disparities research in their disadvantaged community and (2) using a fair and collective process.

The top panel-chosen studies were (1) inflammation: create a longitudinal cohort of patients (aged ‡65 years) to explore the effects of inflammation on aging-related health outcomes; (2)cognitive function: measure microbiome levels in patients with varying levels of cognitive dysfunction to determine iflower microbiome levels may be associated with decreased cognitive function; and (3) depression and isolation: conduct a comparative effectiveness study of existing depression interventions for adults with HIV to determine the most effective interventions for wide-scale community implementation. Guided by the panels' decisions, HARP-PS is currently partnering with researchers to implement the top panel-chosen studies in Palm Springs.

Pacific Islanders With Mental Health Distress

Pacific Islanders are a neglected US racial group that has endured extensive colonization and historical traumatization, resulting in heavy mental and physical health disparities (e.g., diabetes, cancer, suicide).34,35 In

recent data, Pacific Islander adults reported 3 times the national rate of major depression, 2 times the national rate of generalized anxiety disorder, and 4 times the national rate of alcohol use disorder.36 Yet Pacific Islanders rarely seek mental health services, which are largely incompatible with their cultural conceptions of mental illness and recovery.36 To reduce this disadvantaged population's high unmet need, the National Institute ofMental Health funded the use of citizens' panels (Figure 2) to create the first culturally tailored mental health treatment- seeking intervention for US Pacific Islander populations. The target communities consisted of urban Samoans in Los Angeles County, California, and rural Marshallese in northwest Arkansas because they compose the largest and fastest-growing Pacific Islander communities, respectively, in the continental United States.

In the first step, we established partnerships with the Office of Samoan Affairs and the Arkansas Coalition of Marshallese, 2 prominent community-based organizations serving our target communities. In the second step, our partners recommended that the sample should contain equivalent numbers of (1) men and women and (2) people aged 18 to 26, 27 to 40, 40 to 54, and 55 years and older with (3) low versus high familiarity with mental illness. Recruitment was conducted through community organizations (e.g., churches, community centers) by trained Pacific Islander staff. On the basis of prior community survey and focus group data, it was determined that the panels should select and then culturally tailor existing evidence-based strategies for addressing Pacific Islanders' 3 key treatment-seeking barriers: (1) low mental health literacy, (2) high mental health stigma, and (3)poor treatment knowledge leading to treatment misperceptions (e.g., treatment is expensive, not confidential). To create a menu ofevidence-based strategies for panel deliberation, a literature review of mental health literacy, antistigma, and educationentertainment interventions was performed. Presentation content and questions were reviewed, edited, and approved by our partners for framing, cultural validity, and comprehension.

Sixty-four participants attended citizens' panels held in the target Samoan and Marshallese communities. Although the panels included high-status community leaders (e.g., clergy, elders, diplomats) whose presence might unintentionally suppress deliberation, deliberations proceeded smoothly as facilitators modeled a balance of allowing elders and leaders to express their opinions first in the panels, and then making a point of calling on additional participants and stakeholders for their opinions. Key to this open group discussion was reiterating that each participant's opinions pertained to his or her experience and stakeholder group (e.g., young adults' decisions were relevant to young adult mental health needs).

Because Pacific Islander cultures transmit important cultural information through storytelling, panel participants collectively decided that storytelling would be pivotal to intervention success. Thus, for increasing mental health literacy, the panels specified that conventional evidence-based literacy materials should be presented and then reinforced using short filmed stories with Pacific Islander actors (e.g., testimonial of Pacific Islander sharing his or her depression story). To decrease stigma, 6 culturally bound myths (from 12 total) were chosen to be refuted: Pacific Islanders with mental illness

1. are damaged,
2. are dangerous,
3. are intellectually disabled,
4. cannot handle a job,
5. possess "bad blood," and
6. will be discovered ifthey seek treatment.

To reduce treatment misperceptions, the panels chose 5 treatment questions (from 10 total) to be answered:

1. What is mental health treatment?
2. What are my treatment options?
3. How do I seek treatment?
4. What is the cost?
5. Will treatment be confidential?

Armed with the panels' decisions, the team designed Talking Story-the first culturally grounded mental health treatment-seeking intervention for Pacific Islanders-and received additional funding from the National Institute of

Alcohol Abuse and Alcoholism to use citizens' panels to design a culturally grounded alcohol prevention intervention for Pacific Islander young adults.

CONCLUSIONS

The presented case evidence indicates that citizens' panels are a novel methodology for tailoring CBPR-oriented research and interventions to the health disparity-related priorities, preferences, and needs ofdisadvantaged communities-potentially enhancing community congruence, participation, and impact. For example, applying citizens' panels allowed HARP-PS to narrow its long-term research agenda to 3 high-value, community-preferred studies. Similarly, citizens' panels allowed our team to utilize public insight from a hard-to-reach community to transform conventional evidence-based strategies into a novel intervention responsive to Pacific Islander mental health perspectives, barriers, and practices.

Situations in which citizens' panels may be most appropriate include those (1) early in community-based partnerships, when professionals may use panels to develop a publicinformed research agenda as the foundation for long-term partnership, and (2) later, when communities are interested in designing and implementing community-based solutions to local health disparities.

From our experience implementing citizens' panels with disadvantaged populations, we present several challenges and limitations. First, conflict may emerge between professionals and community partners during panel design and implementation on issues such as panel topics, content, and data interpretation and dissemination. To avert such conflicts, partners should be given equal decision-making power-or be heavily consulted-in all phases, including design, interpreting panel decisions, and determining next steps, using written agreements as required.37 If conflicts arise, professionals should seek mutually acceptable solutions- involving an independent mediator if necessary37-to fulfill their ethical CBPR obligation to protect community interests and preserve long-term trust.9,37

Second, executing citizens' panels requires significant planning and investment in time, energy, and resources.21 Although our funding experiences -along with those of earlier deliberative methods studies -suggest that government and health entities are receptive to funding deliberative methods to target community health disparities, the costs and efforts in conducting citizens' panels could present an implementation barrier, especially for disadvantaged communities. Thus, professionals should first discuss with community partners the costs, benefits, and feasibility of using panels to advance intended CBPR work.

Finally, echoing earlier findings,13,38 both sets of participants reported during postpanel debriefings that citizens' panels were stimulating, informative, and empowering-increasing participants' knowledge of stigmatized health disparity topics and motivation to participate in follow-up research. Still, further research is needed to determine panels' efficiency and costeffectiveness by comparing the costs of citizens' panel decisionmaking with those of alternative decision-making mechanisms (e.g., expert panels).

In closing, to eliminate health disparities, public health actions must engage community members in promoting health change39 and be sustained over time.3 Citizens' panels support these aims by informing and involving lay members of disadvantaged communities-engaging their collective expertise, decision-making, and will-to achieve the short-term goal of improving health disparities research and interventions, and the long-term goal ofproducing an informed public prepared to lead this work after professionals depart. By centering the voices of our nation's most disadvantaged residents,40 affording them influence over public health decision-making, citizens' panels may stimulate public participation and activism41 and strengthen disadvantaged communities' capacity to advocate for structural change39 to achieve enduring reductions in health disparities and lasting health equity.

CONTRIBUTORS

A. M. Subica designed the citizens' panels for health equity approach and wrote the first draft ofthe article. B.J. Brown refined subsequent drafts of the article. Both authors conducted the panels and analyses and approved the final article.

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Sidebar
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DETAILS

Subject:	Health problems; Principles; Public health; Citizens; Values; Violence; Health disparities; Community; Environmental impact; Decision making; Democracy; Disadvantaged; Residents; Focus groups; Health research; Panels; Medical research; Interest groups; Methods; Driving conditions; Health risks; Stakeholders; Grass roots movement
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Area-Wide Traffic-Calming Zone 30 Policy of Japan and Incidence of Road Traffic Injuries Among Cyclists and Pedestrians

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ABSTRACT (ENGLISH)

Objectives. To quantify the impact of the "Zone 30" policy introduced in September 2011 on the incidence of cyclist and pedestrian injuries in Japan. Methods.This was an interrupted time-series study. We used the data of cyclist and pedestrian injuries recorded by the Japanese police between 2005 and 2016. We evaluated the monthly number of deaths and serious injuries per person-time on narrow roads (width<5.5 m, subjected to the policy) compared with that on wide roads (> 5.5 m) to control for secular trends. We regressed the injury rate ratio on 2 predictors: the numbers of months after January 2005 and after September 2011. Using the regression results, we estimated the number of deaths and serious injuries prevented. Results. There were 266 939 deaths and serious injuries. By 2016, the cumulative changes in the rate ratio spanned from -0.26 to -0.046, depending onsexand age,and an estimated number of 1704 (95% confidence interval = 1293, 2198) injuries were prevented. Conclusions. The policy had a large preventive impact on cyclist and pedestrian deaths and serious injuries at the national level. (Am J Public Health. 2020;110: 237-243. doi:10.2105/AJPH.2019.305404)

FULL TEXT

Headnote

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Methods. This was an interrupted time-series study. We used the data of cyclist and pedestrian injuries recorded by the Japanese police between 2005 and 2016. We evaluated the monthly number of deaths and serious injuries per person-time on narrow roads (width <5.5 m, subjected to the policy) compared with that on wide roads (≥ 5.5 m) to

control for secular trends. We regressed the injury rate ratio on 2 predictors: the numbers of months after January 2005 and after September 2011. Using the regression results, we estimated the number of deaths and serious injuries prevented.

Results. There were 266 939 deaths and serious injuries. By 2016, the cumulative changes in the rate ratio spanned from -0.26 to -0.046, depending on sex and age, and an estimated number of 1704 (95% confidence interval = 1293, 2198) injuries were prevented.

Conclusions. The policy had a large preventive impact on cyclist and pedestrian deaths and serious injuries at the national level. (Am J Public Health. 2020;110: 237-243. doi:10.2105/AJPH.2019.305404)

(ProQuest: ... denotes formulae omitted.)

Globally, road injuries are a leading cause of mortality and morbidity, killing approximately 1.3 million people and injuring tens of millions annually.1,2 Cyclists and pedestrians represent a quarter of all road fatalities, and the proportion varies substantially among countries.1 The benefits of safeguarding cyclists and pedestrians are not limited to reduced road injuries; active travel is conducive to health,3 6 and previous studies reported that neighborhood walkability was associated with increased physical activity,7 lower body mass index,8,9 better profiles for metabolic risk factors,10 and lower diabetes incidence.9 Moreover, promoting active travel reduces fossil fuel consumption and ultimately protects public health by improving ambient air quality and moderating climate change.11

Evidence shows that area-wide trafficcalming interventions reduce road injuries involving cyclists and pedestrians. These interventions include a maximum speed limit of 30 kilometers per hour or lower, installing traffic-calming devices such as road bumps and chicanes, temporary or permanent road closings, enhancing visibility of road signs, and increasing law enforcement in the area.12 A systematic review found a modest reduction of road injuries in the area with a pooled rate ratio of 0.8512; more recent studies that investigated the effectiveness of 20-miles-per-hour zones in London, England, found 41.9% and 24% reductions of those killed and seriously injured, respectively, within these zones.13,14 Twentymiles-per-hour zones were also effective in preventing road injuries in New York, NY.15

However, the effectiveness of such interventions could be undermined if conducted inappropriately; for example, in Seoul, South Korea, the ineffectiveness of its Silver Zone policy was likely because of a mismatch between the high-casualty and intervention 16 areas.

In Japan in 2010, cyclists and pedestrians represented 51% of all fatal cases, and the proportion was higher than that in other densely populated high-income countries such as the United Kingdom (28%), Germany (23%), and France (16%).17 In addition, previous area-wide traffic-calming policies in Japan had limited effects in preventing road injuries involving cyclists and pedestrians presumably because they sometimes lacked effective measures such as the low maximum speed limit or failed to spread widely as a result of demanding requirements and a low level of support by local residents.18-21

Against this backdrop, Japan started a new area-wide traffic-calming policy, "Zone 30," in residential areas throughout the country in September 2011.18,20 Leveraging lessons learned from previous road safety policies since the 1970s,22 the Zone 30 policy enhanced community engagement through its multisectoral approach that involves local residents, local governments, police, and the Ministry of Land, Infrastructure, Transport and Tourism.19,20 It also relaxed regulations on requirements for the zone by abolishing minimum area requirements and requiring only a 30-kilometers-per-hour speed limit in the zone, which can be implemented with a relatively small budget (see Methods for details). These amendments facilitated the zone's nationwide spread, and 3105 zones were designated between September 2011 and March 2017.18 There is good evidence that area-wide traffic-calming is effective in preventing road injuries for cyclists and pedestrians12-15; however, no study has reported the impact of enhancing community engagement and limiting the requirements for the designation of areas to a maximum speed limit in an area-wide traffic-calming policy for cyclist and pedestrian safety at the national level, and the Zone 30 policy provides a unique opportunity to do so.

Therefore, the objective of the present study was to quantify cyclist and pedestrian injuries prevented by the policy.

Specifically, we attempted to answer the following 2 research questions: To what degree did the cyclist and pedestrian injury rate per persontime on local roads decrease compared with that on arterial roads after the introduction of the policy at the national level? And how many cyclist and pedestrian injuries were totally prevented by the policy between September 2011 and December 2016?

METHODS

This was an interrupted time-series study. Using monthly longitudinal data on the incidence of road injuries in Japan between 2005 and 2016, we examined whether the introduction of the Zone 30 policy in September 2011 (or the 81st month of the study period) prevented road injuries on local narrow roads compared with arterial wide roads.

Study Setting

Japan introduced its first area-wide trafficcalming intervention ofSchool Zone in 1972, followed by Neighborhood Zone in 1974, Silver Zone in 1988, Community Zone in 1996, and Safe Walking Area in 2003.19 However, the effectiveness of these measures in reducing road injuries between 2000 and 2010 was limited; only an 8.0% reduction in road injuries on narrow roads (road width< 5.5 m) was observed, which was significantly lower than the 29.2% reduction on wide roads (5.5 m). This was presumably because these interventions sometimes lacked essential components of effective area-wide traffic-calming interventions, such as lower maximum vehicle speed limits and clearly visible road signs to inform drivers about the zone.18,19 In addition, some interventions were not applicable to small areas or were not supported by local residents, or the budget was not sufficient for the implementation.18,20,21 For example, Community Zone required a minimum area of 0.25 square kilometers to be designated, and this limited the number of zones designated in the whole country to up to 40 per year.18

The Zone 30 policy enhanced community engagement through its multisectoral approach that involves local residents, local governments, police, and the Ministry of Land, Infrastructure, Transport and Tourism.19 Stronger community engagement led to local residents' increased support for designating zones in their neighborhood and the zone's nationwide spread. To further facilitate dissemination, the policy required only a maximum vehicle speed limit of 30 kilometers per hour in the zone without a minimum area requirement. In addition to the speed limit, some of the following optional measures were included: establishment of clearly visible road signs upon entrance to the zone to inform drivers, notification alerts in car navigation services upon entering the zone, installation of traffic-calming devices and improved pedestrian paths, erasing the centerline of the road, and measures that facilitate efficient traffic flow around the zone to discourage motor vehicle drivers from entering the zone.18,20 Table 1 shows the proportion of zones with each optional measure. The zones were designated on the basis of local residents' requests, traffic volume, crash frequency, and the presence of elementary and junior high schools and public and tourist facilities.23 As of March 2017, 3105 zones were established, thus exceeding the original target of 3000 zones.18

Data Sources and Variables

We obtained national police data on the monthly number of road injuries in Japan between January 2005 and December 2016 from the Institute for Traffic Accident Research and Data Analysis and monthly estimated population data for the same period from the National Statistics Bureau.24 The police data were collected according to a standardized definition of measurements.25 Categorization of the obtained data was based on the definitions used in the police data: time (year and month); width of road where the crash occurred (< 5.5 m and >5.5 m); sex, age (0-14, 15-24, 25-64, 65-74, and 75 years), and mode of transport (cyclists and pedestrians) of the victims; and severity of injury (death, serious injury, and minor injury). Death from the crash was defined as a death that occurred within 24 hours from the crash, and an injury was defined as "serious" ifit was estimated to require medical care for 30 days or longer by the physician, or else it was defined as "minor."25

Outcome Variable for Evaluation

We evaluated occurrence of fatal and serious injuries, unless otherwise noted, because a previous study showed that the incidence of fatal and incapacitating injuries decreased more than that of nonincapacitating and minor injuries among pedestrians when the speed limit was reduced from 40 to 50 kilometers per hour to 30 kilometers per hour.26 We calculated the monthly incidence rate of deaths and serious injuries (hereafter referred to as "injury

rate"): the numerator was the number of fatal and serious injuries, and the denominator was the corresponding population size divided by 12 multiplied by 100 000 (injuries per 100000 person-years). Then, we calculated injury rate ratios by dividing the rate on the narrow roads by the corresponding rate on the wide roads. We assumed that the Zone 30 policy affected the injury rate on the narrow roads exclusively ifit had an effect because only these narrow roads with a single lane, including those with 2 lanes at the time of the zone designation but that were planned to be downsized to 1 lane, were covered under the policy as "local neighborhood roads."19,20 The use of ratios enabled us to examine the effect of the policy while controlling for secular trends that were not affected by the policy,27-30 including those of the incidence of cyclist and pedestrian injuries on wide roads and of standards of prehospital and medical care for road injuries. Using the rates on wide roads as the denominator of the ratio would be justified because adverse spillover effects were not observed around the 20-miles-per-hour zones in London and New York.13,15

Descriptive Statistics

We pooled the 12-year data and described the number of injuries stratified by width of road, sex, and age. We displayed the trends of the monthly injury rates stratified by width ofroad, sex, and age and the injury rate ratios stratified by sex and age.

Interrupted Time-Series Analysis

We evaluated the effectiveness of the policy by regressing the longitudinal injury rate ratio stratified by sex and age on the number of months after January 2005 (predictor: month) and after September 2011 (predictor: slope_change_ajter_81st_month):

... (1)

where b1 represents the average monthly change in the predicted rate ratios before September 2011, and the predictor slope_change_ajter_81st_month allowed the predicted rate ratios to have a knot at the 81st month. We hypothesized that b2 was a negative number (i.e., the slope of the rate ratios went downward at September 2011) if the policy was effective. To facilitate interpretation of the results, we converted the monthly rate ratio change to a cumulative change by December 2016 (54th month from September 2011) by multiplying the point estimate and the confidence interval (CI) ofb2 by 54. Because the number of zones increased gradually after the introduction of the policy, we considered no discontinuous gap in the rate ratio in September 2011 and therefore did not include a dichotomous predictor that indicated before or after policy introduction in the model. When the residuals (et) had an autocorrelated structure, we fitted a seasonal autoregressive integrated moving average model.31

Estimation of the Impact

We estimated the number of injuries for cyclists and pedestrians on narrow roads prevented by the policy between September 2011 and December 2016 for each subgroup (stratified by sex and age) with 144

... (2)

where m is the number of month after January 2005 (m = 1), which is identical with the predictor month in the interrupted time series analyses; i (= 1, 2,..., 10) is the subgroup; b2i (with mean ⅜ and standard error s¡) is the estimated monthly change in the rate ratio after September 2011 for subgroup i; and ni;m is the observed number of injuries for subgroup i in the mth month.

To acquire the total number of injuries prevented between September 2011 and December 2016, we summed the estimated numbers across the subgroups; to acquire the CI, we conducted a Monte Carlo simulation of 1000 draws from

... (3)

for each subgroup, plugged them into

... (4)

to obtain 1000 sets of the estimated number of injuries prevented across the subgroups, summed them across the subgroups using each set to obtain 1000 estimated number of injuries prevented, and reported the 2.5th and 97.5th percentiles. In this simulation, we assumed independence of the extent of deviation of drawn b2i across the subgroups (i.e., how many s¡ randomly sampled b2i deviates from m in each draw for each subgroup).

Sensitivity Analyses

We repeated the interrupted time-series analysis with data of all injury severity and those with serious injuries. We also repeated the analysis using data restricted to deaths, pedestrians, and cyclists and stratified by sex but not by age, because the number of injuries was too low for some subgroups. We also estimated the total number of injuries prevented, irrespective of severity. We conducted all statistical analyses with R version 3.4.4 (R Foundation, Vienna, Austria), and we used the sarima function of the astsa package to fit the seasonal autoregressive integrated moving average models.31,32

RESULTS

During the study period of2005 to 2016, there were 28333 deaths and 238 606 serious injuries (totaling 266 939) involving cyclists and pedestrians in Japan. Table 2 shows the number and rate of injuries stratified by width of road where the crash occurred, sex, age, and mode of transport. Among all injuries, the proportion of cases on narrow roads was 28%. The proportion of injuries on narrow roads was higher for the youngest age group compared with all other age groups (Table 2).

The monthly injury rates by width of road, sex, and age showed a decreasing trend for all subgroups, except for men aged 25 to 64 years on narrow roads, and the decreasing trend in some subgroups on narrow roads appeared to have accelerated after the introduction ofthe Zone 30 policy (Figure A, available as a supplement to the online version of this article at http://www.ajph.org).

The monthly ratio of injury rates on narrow roads to wide roads showed an increasing trend before the policy was introduced followed by a decreasing trend after the introduction among boys aged 0 to 14 years (Figure B, available as a supplement to the online version of this article at http:// www.ajph.org). Other subgroups did not show a clearly visible trend.

Interrupted Time-Series Analysis

This was the main analysis of our study. Table 3 shows the results of the interrupted time-series analyses of the injury rate ratios among cyclists and pedestrians of the 10 subgroups. The Zone 30 policy decreased the rate ratios in all 10 subgroups, reflected by negative point estimates for the coefficient of slope_change_after_81st_month, and their 95% CIs did not include the null value (i.e., 0 in 6 subgroups). The largest absolute effect of-4.1 multiplied by 10 3 per month was observed in boys aged 0 to 14 years, followed by -2.9 multiplied by 10-3permonthinmenaged 15 to 24 years; these effects are equivalent to cumulative relative changes of -0.26 (95% CI = - 0.38, -0.15) and -0.19 (95% CI = -0.28, -0.090), respectively, in the rate ratio between September 2011 and December 2016 (data not shown). Cumulative relative changes of the other subgroups ranged from -0.11 to -0.046.

Estimation of the Impact

Table 4 shows the estimated number of injuries prevented by the policy between September 2011 and December 2016. In total, 1704 injuries were prevented, more than two fifths of whom were boys aged 0 to 14 years or women aged 75 years or older.

Sensitivity Analyses

The results of the interrupted time-series analyses of the data of all injury severity and of those that were restricted to serious injuries, pedestrians, or cyclists were similar to those of the main analysis, except that those restricted to serious injuries produced 2 more subgroups (women aged 65-74 years and men aged 25-64 years) whose 95% CIs for the coefficient of slope_change_after_81st_month did not include 0 (Table A, available as a supplement to the online version ofthis article at http://www.ajph.org). However, the analyses that were restricted to deaths produced nonsignificant small monthly changes in the rate ratio after the policy was introduced (b2 was -5.4 X 10-4 [95% CI = -1.3 X 10-3, 1.8 X 10-4] for females and 4.2 X 10-4 [95% CI = -4.5 X 10-4, 1.3 X 10-3] formales). The total number of injuries of all severity prevented by the policy between September 2011 and December 2016 was estimated to be 21 639 (95% CI = 17 305, 26 870).

DISCUSSION

After the introduction of the Zone 30 policy in September 2011, the pedestrian and cyclist injury rates decreased on narrow roads compared with wide roads at the national level. The decrease was especially large for boys aged 0 to

14 years, and their cumulative relative change by December 2016 was as large as -26%. Between September 2011 and December 2016, the policy prevented 1704 deaths and serious injuries.

Comparison With Previous Studies

There are a few previous studies that reported the effectiveness of the Zone 30 policy. A pre-post comparison of the number of crashes in the zones revealed an 18.6% reduction in the number of crashes that involved a cyclist or pedestrian between the previous and following years of the intervention23; a difference-in-difference analysis conducted in Saitama, one of the 47 prefectures in Japan, revealed a reduction in the number of crashes in the zones when they were accompanied by improved intersections.33 The present study's estimated effectiveness of the policy (estimates of b2 in Table 3: ranging from -7.3 X 10 4 to -4.1 X 10-3) was smaller than the 18.6% reduction reported in the previous study, which would be approximately equivalent to a change of -0.186 divided by 24 equals -7.8 multiplied by 10-3 per month.23 This is because the previous study examined the reduction of road injuries only in the designated zones, and it did not control for decreasing secular trends, whereas we estimated the average effectiveness on all narrow roads, which include both designated zones and nondesignated areas and also because we controlled for secular trends by using ratios.27-30 If we adjust for the proportion (e.g., in terms of road length or road injuries) of narrow roads in the designated zones among all narrow roads, the estimated effectiveness would become larger; however, no such data are available. This limitation, however, does not undermine the validity of our findings because our study objective was to quantify the impact of the policy at the national level, which does not require estimating the change only in the designated zones.

Meaning of the Study

Our study provides strong evidence that a multisectoral, area-wide traffic-calming policy with local residents' participation and support and relatively relaxed regulations can have a large impact on the incidence ofcyclist and pedestrian injuries at the national level by enabling rapid expansion ofarea-wide trafficcalming projects nationwide. In Japan, before the policy change, strict regulations and oppositions from the residents used to impede the implementation and expansion of such projects. Our study results suggest that promoting a community-based flexible preventive framework beyond traditional regulatory approaches could be a good solution to achieve a safer traffic environment in residential areas in many countries.

Strengths and Weaknesses

A key strength of the present study is that it evaluated the effectiveness of multisectoral area-wide traffic-calming interventions by using complete 12-year data from a country with more than 120 million people. We attributed the previously mentioned changes in the rate ratios and the number of injuries prevented to the Zone 30 policy because we adjusted for the longitudinal trend of the rate ratios before the introduction of the policy by including a linear time variable and because we also accounted for secular changes in the cyclist and pedestrian injury rates in the interrupted time-series analyses.27-30

The consistent results across the 10 subgroups stratified by sex and age show the robustness ofour findings. The quantification of the number of injuries prevented by the policy stratified by sex and age would facilitate dissemination of our findings to decisionmakers and other stakeholders because of their ease of interpretation. We consider that boys aged 0 to 14 years were overrepresented aWe obtained the point estimates for each subgroup with £{n,,m/[1+ Ь2/x (m - 80)]- n,>mg, where m is the number of months after January 2005 (m =1), i(=1,2,..., 10) is the subgroup, ⅜(with mean mi and standard error s¡) is the estimated monthly change in the rate ratio after September 2011 for subgroup /, and n/>m is the observed number of killed or seriously injured cases for subgroup i in the mth month. We obtained the total number of killed or seriously injured cases prevented by summing the estimated numbers across subgroup.

bWe obtained the 95% CI for each subgroup by plugging in the upper and lower limits of b2i 144 to n,_m/[1 + b2, x (m - 80)]- n,_m} .We m=81 obtained the 95% CI for the total number through a Monte Carlo simulation of 1000 draws from b2/~N(mi,si) for each subgroup, assuming independence of randomness among the subgroups. See the "Estimation of the Impact" subsection in the Methods for details.

in the number of injuries prevented mainly because of the large reduction in the injury rate ratio. Women aged 75

years or older were also overrepresented mainly because of a rapid increase in the population of this subgroup compared with the other subgroups, which experienced a smaller increase or even a decrease during the study period.

On the other hand, one of the weaknesses of the present study is that there may have been concurrent events that have also affected the outcome of interest specifically, which is often unavoidable in longitudinal observational studies; however, we are not aware of such events. In addition, the rate ratios started decreasing immediately after the time of the introduction ofthe policy, especially for boys aged 0 to 14 years, which would enhance our interpretation that the observed decrease is because of the policy. Another weakness is that we were not able to adjust for the distance traveled by cyclists and pedestrians or the frequency of passages. If these data were available, the estimated effect ofthe policy on injury rates would become larger than the estimates of the present study because the policy may have improved perceived traffic safety in the neighborhood and increased active travel.34,35

The small and insignificant changes in the rate ratios ofdeaths were unexpected because it is well-established that the preventive effect of reducing the speed limit is larger for fatal injuries than for minor injuries.26 It is necessary to examine whether measures taken in each zone are effective in preventing deaths and whether the intervened areas match high-fatality areas.16

To better inform decision-makers, in addition to the policy's effect shown in this study, an analysis of the cost-effectiveness of the policy would be useful. Another direction of future research is to examine whether optional measures in the zones in addition to the speed limit modified the effectiveness.

Conclusions

The area-wide traffic-calming Zone 30 policy introduced in September 2011 decreased the cyclist and pedestrian injuries on local narrow roads compared with arterial wide roads in Japan. The successful multisectoral policy with local residents' participation and relatively relaxed regulations had a large preventive impact on the rate and number of deaths and serious injuries among cyclists and pedestrians. ÂfPU

CONTRIBUTORS

M. Ichikawa conceptualized the study and obtained the data. H. Inada and M. Ichikawa designed the study. H. Inada analyzedthe data anddrafted the article.J. Tomio, S. Nakahara, and M. Ichikawa made comments that led to substantial revisions ofthe article, andall authors approved the final version. H. Inada, being the corresponding author, attests that all listed authors meet authorship criteria and that no other individuals meeting authorship criteria have been omitted. H. Inada accepts full responsibility for the work and the conduct of the study, had access to the data, and controlled the decision to publish.

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The authors declare no conflicts of interest other than the previously mentioned research grant.

HUMAN PARTICIPANT PROTECTION

This study did not require institutional review board approval because it is an observational study that used only aggregate public domain data.

Sidebar

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DETAILS

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The Need for Better Compliance Assurance Mechanisms to Protect Young People

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ABSTRACT (ENGLISH)

In their new article, Henriksen et al. declare that assurances of voluntary compliance (AVCs) are a promising regulatory mechanism to combat underage tobacco sales and subsequent use (p. 209). In one important case, their findings are heartening, but in two other respects, the findings should cause some concern. AVCs are a formal agreement, akin to a contract, between state attorneys general and a party that has violated, or is deemed likely to violate, consumer protection laws. The authors conducted their own secret shopper compliance checks of retailers in California that had signed AVCs with their state attorney general. They concluded that corporate-owned stores of

retailers that signed AVCs violated minimum age of sale laws at a significantly lower rate than did franchisee-owned stores in the same retail chains. They also observed that violations of other AVC provisions, particularly agreements not to post advertisements that contained more than company trademarks, logos, and product prices, were widely disregarded. These contrasting findings point to the hope and worry associated with the implementation of AVCs.

FULL TEXT

In their new article, Henriksen et al. declare that assurances of voluntary compliance (AVCs) are a promising regulatory mechanism to combat underage tobacco sales and subsequent use (p. 209). In one important case, their findings are heartening, but in two other respects, the findings should cause some concern. AVCs are a formal agreement, akin to a contract, between state attorneys general and a party that has violated, or is deemed likely to violate, consumer protection laws. The authors conducted their own secret shopper compliance checks of retailers in California that had signed AVCs with their state attorney general. They concluded that corporate-owned stores of retailers that signed AVCs violated minimum age of sale laws at a significantly lower rate than did franchisee-owned stores in the same retail chains. They also observed that violations ofother AVC provisions, particularly agreements not to post advertisements that contained more than company trademarks, logos, and product prices, were widely disregarded. These contrasting findings point to the hope and worry associated with the implementation of AVCs.

The authors do provide a hint of what is possible when a state's retailers become compliant with a jurisdiction's minimum age of sales laws. In this instance, corporate-owned stores with AVCs reached a goal set in Healthy People 2020 that was written nearly a decade ago and that was intended to apply to the purchase of cigarettes by people younger than 18 years. These retailers managed to comply with the Healthy People 2020 goal as applied to the sale of e-cigarettes to persons younger than 21 years.

The mechanism that caused corporate stores to be more compliant with sales restrictions is murky, as the authors acknowledge. Examining the text of AVCs does provide clues to what might be happening. An agreement between 47 state attorneys general and the convenience store chain Circle K reveals that the retailer agreed to, among other measures, conduct new computer-assisted training for employees, change the programming of its cash registers, remove tobacco vending machines, institute hiring age limitations, add extra signage informing customers of ID checks for tobacco purchases, conduct secret shopper compliance checks on its own employees, and modify its franchise agreements to strengthen minimum age of purchase protocols.1 The new research shows that these changes seem to have borne fruit in the results achieved, particularly by corporate stores.

However, the frequent violation of advertising restrictions agreed to in the AVCs is a worrying observation that may speak to the fundamental weakness of the AVC as an enforcement mechanism. Fully 80% of AVC corporate stores and 70% of AVC franchise stores displayed tobacco product advertisements that violated the terms of these agreements.

From the perspective of tobacco companies, minimum age of sale restrictions do not dramatically and immediately affect financial bottom lines, as just 2% of cigarettes in the United States are sold to persons younger than 21 years.2 The continued presence of pointof-sale advertisements maintains many more sales to adult smokers by provoking unplanned purchases, disrupting smoking cessation attempts, and normalizing smoking as a social behavior.3 When AVCs fail to achieve agreed on limits to tobacco advertising, they demonstrate that retailers will act in their financial interest if they believe they will not be subject to substantial penalties for violations of agreements. The effectiveness of voluntary compliance regimes seems to vanish when the other 98% of tobacco sales to consumers aged 21 years and older that should be affected by the elimination of attractive point-of-sale advertising is at stake.

Although AVCs in this study show promise as an intervention to address underage tobacco sales and use, one must wonder whether these policies are preferable to passing statutes and regulations to reach the same goals. Henriksen et al. describe a useful investigation of the effects of voluntary measures to improve compliance with minimum age of sale laws, but their discussion perhaps misses an opportunity to address other measures that might improve compliance, particularly strong tobacco retail licensure.

Voluntary agreements, although theoretically easier to extract from the private sector, may be a less effective method for making public health policy than is changing statutes through a more difficult process of passage. In the world of tobacco, there is a well-documented history of the industry employing corporate social responsibility strategies to forestall more effective public action.4 The public, along with state attorneys general, must be wary that efforts to improve public health through AVCs risk diverting action from pursuing effective public policy change. Studies pointing to the favorable effects of voluntary measures can inadvertently support such diversion if they are exploited by retailers, manufacturers, or other groups with vested interests that do not have the public's health as their animating goal.

The recent push for raising the minimum age of purchase of tobacco products to 21 years (Tobacco 21) was led by public health policy entrepreneurs before being partially cooptedby tobacco companies.5 Tobacco companies have advocated the adoption of Tobacco 21 laws that, contrary to good public health practice, are designed to punish underage tobacco users and the salesclerks who sold them tobacco products instead of the tobacco companies and retailers who profit from the sale of the products to the underage party. The Tobacco 21 measures that are most likely to benefit public health are those that align incentives for compliance with the financial incentives of retailers.6 It should not be profitable to violate public policy.

Therefore, state attorneys general might find the violations of AVCs to be worthy of their attention as they pursue solutions to the latest wave of nicotine addiction amongyouths. Retailers can be referred to courts for violating their AVCs. Whether such regulatory action will successfully turn the tide against youth nicotine use remains a subject for future study. >4jPI-l

Alex C. Liber, MSPH

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CONFLICTS OF INTEREST

The views expressed here represent the views ofthe author and may not represent the views ofthe American Cancer Society or the American Cancer Society Cancer Action Network.

Sidebar

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DETAILS

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Pleasure and Sex Education: The Need for Broadening Both Content and Measurement

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ABSTRACT (ENGLISH)

Sex education in the United States is limited in both its content and the measures used to collect data on what is taught. The risk-reduction framework that guides the teaching of sex education in the United States focuses almost exclusively on avoiding unintended pregnancy and sexually transmitted diseases, overlooking other critical topics such as the information and skills needed to form healthy relationships and content related to sexual pleasure. Young people express frustration about the lack of information on sexuality and sexual behavior that is included in sex education programs; sexual and gender minority youths, in particular, feel overlooked by current approaches. International guidance provides a more robust framework for developing and measuring sex education and suggests a number of areas in which US sex education can improve to better meet the needs of youths. (Am J Public Health. 2020;110:145-148. doi:10.2105/ AJPH.2019.305320)

FULL TEXT

Headnote

Sex education in the United States is limited in both its content and the measures used to collect data on what is taught. The risk-reduction framework that guides the teaching of sex education in the United States focuses almost exclusively on avoiding unintended pregnancy and sexually transmitted diseases, overlooking other critical topics such as the information and skills needed to form healthy relationships and content related to sexual pleasure. Young people express frustration about the lack of information on sexuality and sexual behavior that is included in

sex education programs; sexual and gender minority youths, in particular, feel overlooked by current approaches. International guidance provides a more robust framework for developing and measuring sex education and suggests a number of areas in which US sex education can improve to better meet the needs of youths. (Am J Public Health. 2020;110:145-148. doi:10.2105/ AJPH.2019.305320)

See also Landers and Kapadia, p. 140, and the AJPH Public Health of Pleasure section, pp. 145-160.

Sex education is the one school subject that is supposed to provide adolescents with the information and skills they need to navigate relationships, understand sex and sexuality, and find the resources they need for obtaining additional information and relevant health services. Despite often being framed in the United States as a tool for risk reduction, quality sex education should be guided by the broader goals of supporting young people's sexual health and wellbeing and helping them grow into sexually healthy adults.1,2

In the United States, available guidelines for sex education include the Guidelines for Comprehensive Sexuality Education, K-12, which were first published by the Sexuality Information and Education Council of the United States (SIECUS) in 1991 and have been updated twice (most recently in 2004),3 and the National Sexuality Education Standards, published by the Future of Sex Education Initiative in 2011.4 These guidelines, as well as international guidelines for sex education, especially the recent UNESCO International Technical Guidance on Sexuality Education, identify learning objectives in key areas that embrace a broad view of sexuality, including relationships, gender, skills for health and wellbeing, and sexuality and sexual behavior.5 The available research on sex education in the United States reveals that most young people receive instruction on only a small subset of these topics, with greatest attention given to more narrowly focused risk-reduction topics; even the measures used to ascertain what young people are learning are largely confined to these risk-reduction topics.6,7 Focusing on these topics and measures overlooks many key aspects of young people's current and future sexual lives, including the ability to form and maintain healthy relationships; the right to decide whether, when, and with whom to engage in sexual behavior; and the fact that sex should be pleasurable, to name just a few.

Thus, the narrow content of sex education in the United States needs to expand to focus more on sexual health than sexual risk8; surveillance metrics also need parallel expansion beyond risk prevention. Traditional public health goals for sex education in the United States have largely focused on helping young people to avoid unintended pregnancy and sexually transmitted infections (STIs), and the proximate sexual and contraceptive behaviors related to these outcomes. The federal government's Healthy People 2020 objectives related to sex education only include target levels for adolescents' receipt of formal instruction about abstinence, birth control methods, HIV/AIDS, and STIs.9 These narrow objectives both reflect and inform the collection of national surveillance data.

CURRENT NATIONAL SURVEILLANCE EFFORTS

The three main data sets that are used to gather information about the receipt of sex education in the United States are the School Health Profiles (SHP),10 the School Health Policies and Practices Study (SHPPS),6,11 and the National Survey of Family Growth (NSFG).7,12 These are broad federal data collection efforts with a limited set of sex education measures. The NSFG, conducted by the US National Center for Health Statistics, is a nationally representative household survey that has tracked young people's receipt of sex education since 1982. It has interviewed adolescents directly about receipt of different topics over time, with a focus on instruction about saying no to sex, waiting until marriage to have ABOUT THE AUTHORS

sex, birth control methods, and STI/HIV prevention.13 The NSFG measures are not designed to collect information about the quality of instruction, the amount of instruction, or even much about its content or tone.14 For example, the survey item that asks if adolescents were taught about "methods of birth control" does not distinguish between instruction that presents contraception in a positive or negative manner. Further, the pedagogical approach used is completely ignored. For example, a didactic presentation on methods of contraception is very different from asking students to role-play talking to a potential partner about using birth control. However, for either of these approaches, an NSFG respondent would be expected to answer that they were taught about birth control. Additionally, young people are only asked to report on the age at which they first receive sex education, providing no information about instruction as they get older. Despite these limitations, in addition to its use in general surveillance, multiple studies

have used NSFG data to link receipt of formal sex education to adolescent sexual and reproductive health behaviors and outcomes.

The Centers for Disease Control and Prevention (CDC) conducts two key surveillance efforts-the SHP and the SHPPS-that monitor many school health policies and practices, including health education, and collect data on the provision of sex education. The SHP monitors school health policies and practices in 48 states, 21 large urban school districts, and 4 territories. It covers a broader range of sex education topics than the NSFG, monitoring provision of 19 specific sexual health topics in grades 6 through 12 and some information about instruction prior to the sixth grade, as well as some measures of relevant teacher training.10 The complementary SHPPS is a national survey conducted periodically at the state, district, school, and classroom levels. The SHPPS includes measures of requirements for sex education on topics focused around pregnancy prevention, STI/HIV prevention, and human sexuality, including some indicators of teacher training and classroom time spent on these topics.11 Both the SHP and SHPPS data are collected from school administrators and teachers, not from young people themselves, so they likely reflect what is supposed to be taught rather than what students actually receive. Additionally, the CDC collects the Youth Risk Behavior Surveillance System (YRBS), a nationally representative survey of high school students. From 1993 to 2013 the YRBS asked a single item about receipt of HIV/AIDS education, but this question was removed in 2015.1

All of these US surveillance systems focus on topics using a risk-reduction framework and do not examine many broader sexual health promotion topics such as communication or relationships, despite national guidelines for sex education that include these topics. For example, one of the only communication measures in the SHP is, "Use interpersonal communication skills to avoid or reduce sexual risk behaviors."10 The SHP has a single measure to ascertain what middle and high school students receive in sex education related to relationships: "how to create and sustain healthy and respectful relationships."10 The NSFG measures of instruction about "how to say no to sex" or " waiting until marriage to have sex" might generously be construed as indicators of communication and relationship topics.

EXPANDING SURVEILLANCE TO INCLUDE PLEASURE

By contrast, the recent UNESCO guidance suggests numerous learning objectives related to the topic "friendship, love, and romantic relationships," which is only one of four topics included in the section on relationships. There are 14 objectives related to "friendship, love and romantic relationships" for children aged 5 to 8 years, 10 objectives for ages 9 to 12 years, 11 for ages 12 to 15 years, and 7 for ages 15 to 18 years.5

Both the older SIECUS Guidelines for Comprehensive Sexuality Education3 and the National Sexuality Education Standards4 identify the importance of including topics related to communication and healthy relationships, although they offer a narrower and less detailed set of objectives than the recent UNESCO guidance. Still, none of these three sets of guidelines could be adequately monitored with current US surveillance measures given their narrow focus on risk-reduction topics.

An examination of the UNESCO-recommended topics related to sexual pleasure shows even more of a discrepancy between important sexuality topics and what is taught and measured in the United States. There are several learning recommendations related to pleasure in the UNESCO technical guidance, including "describe ways that human beings feel pleasure from physical contact (e.g. kissing, touching, caressing, sexual contact) throughout their life," which is a learning objective for children aged 9 to 12 years; "state that sexual feelings, fantasies and desires are natural and not shameful, and occur throughout life," which is a learning objective for those aged 12 to 15 years; "understand that sexual stimulation involves physical and psychological aspects, and people respond in different ways, at different times," which is a learning objective for those aged 12 to 15 years, and which includes as a key idea for ages 15 and older that "Engaging in sexual behaviours should feel pleasurable and comes with associated responsibilities for one's health and well-being."5 The SIECUS guidelines do not include pleasure as a separate topic, although some messages related to pleasure are included (e.g., under the topic of "shared sexual behavior," a suggested message is "Couples have varied ways to share sexual pleasure with each other").3 Regardless, the US surveillance systems ignore topics related to pleasure completely. Ignoring pleasure not only leaves out a salient

component of sexual health but may also put young people at risk for reduced use of contraception and condoms, as there is evidence that concerns about reductions in pleasure act as a barrier to both contraception and condom use.18,19 Further, failing to address pleasure may have implications for sexual coercion, as sex education may be one of the only places that young people learn that sex should be pleasurable and not used in manipulative and harmful ways. Indeed, a recent study found that school-based sex education that included instruction in refusal skills prior to college was protective against the likelihood of experiencing sexual assault once in college.20

YOUTH PERSPECTIVES AND THE CURRENT LANDSCAPE

If we look beyond these national surveillance systems, we find that when asked about sex education, young people are dissatisfied with the dearth of messages related to positive aspects of sexuality and the narrow ways that sex is discussed. For example, in a qualitative analysis of stakeholders, including youths, adolescents frequently mentioned the lack of discussion about pleasure as a reason they were frustrated with sex education.21 The experience of sexual and gender minority youths is even worse, with young people feeling either overlooked or subjected to information that is exclusively heteronormative.22,23 Providing instruction that is inclusive of lesbian, gay, bisexual, and transgender (LGBT) youths is important, and surveillance measures should monitor it. There are no measures in the NSFG about whether sex education is LGBT inclusive. The SHP has only a single yes-no item in the teacher questionnaire: "Does your school provide curricula or supplementary materials that include HIV, STD [sexually transmitted disease], or pregnancy prevention information that is relevant to lesbian, gay, bisexual, transgender, and questioning youth (e.g., curricula or materials that use inclusive language or terminology)?"10 This single item excludes other pertinent issues, including ensuring that all students are taught about sexual orientation and gender identity, that LGBT relationships are recognized throughout the curriculum, and that prevention information is conveyed in a manner that does not alienate or overlook sexual and gender minority students.

What we do know about what young people receive in schools reveals that many receive a dearth of sex education and that what is received can vary considerably by state. For example, the SHP data show that in grades 6 though 8, the percentage of schools that reported teaching all 19 sexual health topics examined varied widely, from 5.1% of schools in Arizona to 40.2% in New Mexico.10 In high schools, the percentage of schools that covered all 19 topics varied from 4.5% in Utah to 84.4% in New Jersey.10 The NSFG documents that although 80% or more of adolescents aged 15 to 19 years report receipt of instruction about HIV/AIDS, STIs, or abstinence-focused topics, instruction about birth control methods, including where to obtain a method and how to use a condom, is less common. In the years 2011 to 2013, only 57% of sexually experienced girls and 43% of sexually experienced boys reported receiving instruction about birth control methods prior to first sex.7

The situation in the United States reflects our particular cultural and political framing of sex education. Both receipt of sex education and surveillance in some other countries are more robust. For example, in Australia, the National Survey ofAustralian Secondary Students has been undertaken about every five years since 1992.24 This sexual health survey asks youths a wide range of knowledge, self-efficacy, and behavior questions about topics ranging from confidence in talking to parents about subjects related to sexuality to whether they have engaged in a variety of sexual behaviors, including kissing, oral sex, and intercourse. The survey also asks students about sources of information, including what they received in

schools, in which classes they received the instruction, and how relevant they found the information to be. In Canada, although there is no ongoing government monitoring of sex education, the national civil society organization, Action Canada for Sexual Health and Rights, is currently undertaking a comprehensive assessment of sex education in all provinces, with a tool they developed using the UNESCO technical guidance as an underpinning (Frederique Chabot, e-mail, March 11,2019). The British National Survey of Sexual Attitudes &Lifestyles asks about receipt of 14 sex education topics, including masturbation, how to make sex more satisfying, and "sexual feelings, emotions and relationships." Additionally, young people are asked about their perceived unmet information needs.25

Young people deserve sex education that is relevant to their lives and includes the knowledge, attitudes, and skills they need in both their current stage of development and throughout their lives. Guidelines, programs, and measures of sex education ought to include the full range of sex education topics and should also include items

related to the pedagogy of sex education, including teaching approaches and student engagement. Recent international guidance provides a road map for broadening the US approach to sex education. The United States should join other countries in making an effort to strengthen sex education provision and surveillance, including updating available guidelines for sex education and broadening the measures used to assess sex education. ÂfPU

CONTRIBUTORS

The authors contributed equally to the conceptualization, research, analysis, and writing of the article.

CONFLICTS OF INTEREST

The authors have no conflicts of interest to disclose.

Sidebar

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DETAILS

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State-Level Changes in Firearm Laws and Workplace Homicide Rates: United States, 2011 to 2017

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ABSTRACT (ENGLISH)

Objectives. To test whether year-over-year strengthening of state-level firearm laws is associated with decreases in workplace homicide rates. Methods. In this time-series ecological study of working people in all 50 US states, we used federal data on workplace homicides by state and year from 2011 to 2017, linked to an index of state-year firearm laws, to characterize the regulatory environment (overall and within legislative categories). We used generalized linear regression to model associations between changes in firearm laws and changes in workplace homicide rates the following year. Results. From 2011 to 2017, more than 3000 people died as a result of workplace homicides; over that period, 23 states strengthened firearm regulations and 23 weakened them. We modeled the impact of states strengthening laws within the interquartile range (IQR;equivalent to adding 20.5 firearm laws). This change was associated with a 3.7% reduction in the workplace homicide rate (95% confidence interval [CI] = -3.86, -3.51). Positive IQR changes in specific categories of firearm laws-concealed carry permitting (-5.79%;95% CI= -6.09, -3.51), domestic violencerelated restrictions (-5.31%; 95% CI= -5.57, -5.05), and background checks (-5.07%; 95% CI = -5.32, -4.82)-were also associated with significant reductions. Conclusions. Strengthening state-level firearm laws may reduce the population-level mortality and morbidity burden posed by workplace homicides. (Am J Public Health. 2020;110:230-236. doi:10.2105/AJPH.2019.305405)

FULL TEXT

Headnote

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Results. From 2011 to 2017, more than 3000 people died as a result of workplace homicides; over that period, 23 states strengthened firearm regulations and 23 weakened them. We modeled the impact of states strengthening laws within the interquartile range (IQR; equivalent to adding 20.5 firearm laws). This change was associated with a 3.7% reduction in the workplace homicide rate (95% confidence interval [CI] = -3.86, -3.51). Positive IQR changes in specific categories of firearm laws-concealed carry permitting (-5.79%; 95% CI = -6.09, -3.51), domestic violence-related restrictions (-5.31%; 95% CI = -5.57, -5.05), and background checks (-5.07%; 95% CI = -5.32, -4.82)-were also associated with significant reductions.

Conclusions. Strengthening state-level firearm laws may reduce the population-level mortality and morbidity burden posed by workplace homicides. (Am J Public Health. 2020;110:230-236. doi:10.2105/AJPH.2019.305405)

Gun violence is a public health crisis in the United States.1 In 2017, 13 205 working-aged adults died from homicide by firearm, the ninth-leading cause of death in this age group.2 Overall, mortality due to gun-related causes among individuals 18 to 64 years of age exceeds that of motor vehicle crashes.

Despite the mortality and morbidity burden attributable to firearms, the United States has passed little federal legislation to regulate their purchase, distribution, storage, or use. Most firearm-related legislative activity has occurred at the state level. Since the early 1990s, every state has passed policies either strengthening or weakening restrictions on the sale, possession, and use of firearms.3 On average, states have become slightly more restrictive in their firearm policies in the past 30 years, particularly policies related to limitations on gun ownership among domestic violence offenders and other high-risk individuals, although many have become more permissive in areas such as "stand your ground" laws and concealed carrying of firearms.4

From a public health perspective, the same structural barriers that have inhibited federal legislation on gun violence also restrict research into its determinants.5 However, a growing evidence base has documented the relationship

between state-level firearm policy changes and firearm-associated homicide rates.6 These studies generally show that, at a population level, background checks7 and regulations for gun buyers (specifically permit to purchase)8 are associated with reductions in- although not elimination of-state-level firearm homicide rates, even after state-level social and demographic characteristics have been taken into account. There is less evidence of the relationship between firearmrelated homicides and other types of gun control measures, such as limits on firearm trafficking or bans on assault weapons or high-capacity magazines.6 In addition, when states strengthen firearm policies intended to protect specific vulnerable populations (e.g., children, domestic violence victims), homicide rates in those groups tend to decline.9,10

Each year, approximately 400 homicides by firearm occur when people are at work, accounting for about 9% of the approximately 4800 workplace fatalities occurring in the United States annually.11 In addition to mortality among victims, workplace homicide can lead to broader morbidity in the form of long-term trauma among coworkers, who are often witnesses and survivors. This trauma is exacerbated by witnesses' need to return to the scene of the homicide each day to earn a living themselves.12

In most research on workplace homicides, national surveillance data have been used to identify trends in rates and subgroups of workers at particular risk.13'14 A few small studies of employer-level determinants of workplace homicide have shown that homicides are more likely to occur at workplaces that permit weapons on site15 and under working conditions such as solo work at night or poor exterior lighting.16 However, higher-level determinants of workplace homicide are unknown. Specifically, to our knowledge, there has been no research on how the state-level policy environment is associated with the likelihood of being killed by another individual at work.

In this study, we assessed whether strengthening ofstate-level firearm laws from 2011 through 2017 was associated with decreases in state-level workplace homicide rates. Also, we tested for associations between changes in subcategories of firearm laws and workplace homicide rates.

METHODS

This study was a time-series ecological investigation. Participants were any people who worked for pay in each of the 50 US states between 2011 and 2017.

Workplace Homicide Rates

Our outcome variable was workplace homicide rates. We identified all workplace homicides occurring in the United States between 2011 and 2017 by state and year using the Census of Fatal Occupational Injuries (CFOI).17 CFOI' the national surveillance system for tracking all occupational fatalities occurring within the country, is a federal-state cooperative program administered through the US Department of Labor's Bureau of Labor Statistics. CFOI is considered the definitive record of occupational fatalities in the United States.

After a death occurs at work, information about the fatality is compiled via data including death certificates and records from workers' compensation, media, the Occupational Safety and Health Administration, and the company at which the event took place. Two independent sources must confirm the work relatedness ofa fatality ifit is to be entered into CFOI. CFOI classifies each verified work-related fatality according to the Occupational Injury and Illness Classification System to document the nature, source, secondary source, and event or exposure that led to the fatality.17 Only fatalities experienced by workers are included in CFOI counts, even if a single event led to casualties among both workers and patrons or clients.

Fatalities categorized as "intentional injury by person" are classified by the Occupational Injury and Illness Classification System as homicides. The subcategories included in this definition are as follows: intentional shooting by another person; stabbing, cutting, slashing, or piercing; hitting, kicking, beating, or shoving; strangulation by another person; bombing or arson; and multiple violent acts by another person.17

We generated state and year workplace homicide rates by dividing the number of workplace homicides (publicly available from CFOI) by the number ofpeople (in 100 000s) employed in the state during the year in question. The latter data are publicly available through the Current Population Survey, administered by the US Census Bureau.18

Firearm-Related Legislation

We obtained information on firearm laws from the State Firearm Laws Database, a publicly available, nonpartisan,

comprehensive database on the presence of firearm laws in each state from 1990 to the present; we used data from 2011 to 2017.3'4 The database has been employed in a number of empirical studies of firearm policies and population health.7,19

The database contains dichotomous indicators on the presence or absence of each of 132 firearm-related legislative provisions for each state-year combination during the study period. Each of the 132 laws is coded so that 1 refers to more restrictive gun access and 0 refers to more liberal access. The law indicators are then summed to create a measure of the overall firearm policy environment in a given state, with higher scores equivalent to stronger firearm regulations.

The 132 firearm laws each fit into one of 13 policy subcategories according to type of law (e.g., laws related to restrictions on domestic violence offenders, laws related to concealed carry permitting). These subcategories contain between one law ("stand your ground" provisions) and 21 laws (laws related to domestic violence). Within each subcategory, the number of law indicators is summed and coded so that higher scores are equivalent to stronger firearm regulations.

Covariates

Using publicly available data from a variety of sources, we adjusted for covariates associated with state-level variation in homicide, suicide, and accidental firearm mortality rates.20 All covariates were measured according to state and year. We initially adjusted for unemployment rate,21 percentage of residents below the federal poverty line,22 racial/ethnic composition (percentage Black, percentage Hispanic),18 percentage of residents with a college education,18 percentage of male residents,18 violent crime rate (exclusive of homicide),23 population density,24 and percentage of the population that is of working age (18-64 years).6 Percentage of Hispanic residents, population density, and proportion ofthe population 18 to 64 years of age were not significantly associated with workplace homicide rates in any models and thus were not retained in our analyses.

Statistical Analysis

We examined associations between state-level firearm laws and state-level workplace homicide risk factors. We used a generalized linear model approach to take into account that the dependent variable, the state-year workplace homicide rate, is strictly positive. We fit the model with a log link and g-distributed errors using robust standard errors clustered by state. We specified a log-g model because the log-g technique (unlike the Gaussian regression commonly used in log-linear models) requires no external transformation, it is more straightforward to interpret, and its residuals allow evaluations of model fit.25

In the estimated model, the key variable explaining a state's workplace homicide rate was the preceding year's firearm law index in that state. We included this lag in the firearm law index to reduce potential error caused by laws being in effect for parts but not all of a given year, as our workplace homicide data were available only annually. Models were adjusted for state-level time-varying characteristics (unemployment rate, percentage of residents below the federal poverty line, percentage of Black residents, percentage of residents with a college education, percentage of male residents, and nonhomicide violent crime rate) as well as year fixed effects to control for time trends.

The generalized linear model was specified as log(homrate^t) = ß0 + ß1lawtotali,t_1 + ß2povertyrater,t + ß3pctmaler,t + ß4pctcolleger,t + ß5violentcrimerater,t + ß6pctblacki,t + ß7unemployrate^t + Φ Yt + uijt for i = 1, 50 and t = 2012, 2017. Yt values are indicator variables for the years 2013 to 2017, with coefficients in the Φ vector. The covariate of interest was the preceding year's firearm index value for state i, lawtotali,t-1.

Subsequently, we examined 13 subcategories of firearm laws4 involving at least one state policy change in the given subcategory over the study period. One policy subcategory (immunity from prosecution for gun manufacturers) included in the State Firearms Law Database did not meet this criterion and was therefore not analyzed in regression models. We modeled each subcategory of firearm laws and workplace homicide rates separately to avoid multicollinearity.

We present parameter estimates (b values) as well as average marginal effects to describe the predicted change in workplace mortality rates in response to an interquartile range (IQR) positive increase in the state-level policy environment. An IQR change across all policy areas is interpreted as the number of firearm laws that a state would

need to add or strengthen to move from being in the weakest firearm law quartile to the strongest quartile. Across all policy areas, this would mean strengthening 20.5 firearm laws on average. We also modeled the effect of an IQR change within specific policy areas (e.g., for concealed carry permitting, this is equivalent to a state strengthening or adding 2 concealed carry laws). We used Stata version 15.1 (StataCorp LLC, College Station, TX) in conducting all of our analyses.

RESULTS

There were 3131 workplace homicides during the study period, ranging from a low of 404 in 2013 to a high of 500 in 2016, which translated to an average of 0.31 homicides per 100 000 workers. On average, workplace homicides accounted for 9% of all workplace fatalities (Table 1).

Over the study period, the Occupational Injury and Illness Classification System classified 2474 (79%) homicides as "intentional shooting of another person." Of these homicides, 61% involved a handgun and 12% involved a rifle; other weapons were not reported. Seven percent of assailants were family members or intimate partners of the victim; 11% were customers, clients, or patients; and 15% were current or former coworkers (Table 1). Retail sales workers, cashiers, and police officers were most likely to be killed by another person while at work.11

The 2011 through 2017 period was an active one for the enactment and implementation of firearm regulations (Table 2). Across all years of the study period, the average state had 26 laws restricting firearms (range = 3-104), with an IQR of 20.5; states in the 25th percentile of firearm policies had 10 firearm-restricting laws, and states in the 75th percentile had 30.5 such laws.

Overall, 23 states strengthened firearm regulations, 23 weakened regulations, and 9 did not change firearm laws during the study period. Five states appeared on both the "strengthened" and "weakened" lists because they either strengthened regulations in one subcategory of laws but weakened them in another (South Carolina, Virginia, and West Virginia) or weakened and then strengthened laws within the same subcategory (Idaho and Oklahoma). The legislative subcategories with the most activity were domestic violence-related laws (17 states strengthened and 3 states weakened regulations), possession regulations (4 states strengthened and 10 states weakened regulations), and concealed carry permitting (6 states strengthened and 8 states weakened regulations).

Using generalized linear models (Table 3), we first tested overall associations between changes in state-level firearm laws and changes in workplace homicide rates. In adjusted models, we found a negative association between strengthening of firearm laws and homicide rates; that is, as laws became more restrictive, homicide rates decreased (b = -0.005; 95% confidence interval [CI] = -0.0087, -0.0023; P = .001). An IQR positive increase in state firearm laws (adding 20.5 laws) was associated with, on average, a 3.68% decrease in the workplace homicide rate.

We then modeled the associations between 13 subcategories of firearm policies and workplace homicide rates. We found that, in 8 of the 13 subcategories, strengthening laws was associated with statistically significant reductions (P< .05) in workplace homicide rates. Strengthening concealed carry permitting legislation was associated with a 5.79% reduction (equivalent to strengthening 2 laws); domestic violence-related restrictions, with a 5.31% reduction (strengthening 6.5 laws); background checks, with a 5.07% reduction (strengthening 4.5 laws); dealer regulations, with a 4.88% reduction (strengthening 5 laws); child safety provisions, with a 3.99% reduction (strengthening 3 laws); gun trafficking restrictions, with a 3.82% reduction (strengthening 2 laws); buyer regulations, with a 2.75% reduction (strengthening 3 laws); and ammunition regulations, with a 2.28% reduction (strengthening 1 law).

There were no statistically significant associations between workplace homicide rates and high-risk gun owner prohibitions, possession regulations, assault weapons bans, preemption, or "stand your ground" laws.

In sensitivity analyses, we found that the association between state firearm policy changes and workplace homicides did not vary meaningfully by the number of state firearm policies at baseline (Table A, available as a supplement to the online version of this article at http://www.ajph.org).

DISCUSSION

Using state-level data on workplace homicides, we tested whether year-over-year strengthening of firearm laws was associated with lower rates ofworkplace homicides. We found that as states strengthened regulations related to firearms, workplace homicide rates decreased. Although other studies have shown that stronger firearm laws reduce

overall homicide rates, this study provides some of the first evidence that workplace homicide rates are also sensitive to changes in state firearm laws. More broadly, it provides further evidence that strengthening certain firearm restrictions may be an effective tool for reducing homicide rates in a variety of settings, including workplaces.
Several of the legislative subcategories associated with reductions in workplace homicide rates are meaningful in a workplace context. One is strengthening restrictions on gun possession among domestic violence offenders. We found that strengthening 6.5 laws, the IQR for policies related to firearm possession among these offenders, would be associated with a 5.31% reduction in workplace homicides. About 7% of workplace homicides are committed by a relative or intimate partner of the victim (Table 1).
Prior studies have shown that laws requiring domestic violence offenders to relinquish their firearms are associated with decreases in firearm-related intimate partner homicide.10 Such policies may reduce workplace homicides in 2 ways. First, they may directly reduce domestic abusers' ability to kill their intimate partner (and the partner's coworkers) while the partner is at work. Second, perpetrators ofdomestic violence are more likely than the general population to exhibit behaviors (especially stalking) that may be precursors to homicides involving people other than the intimate partner.26 Removing guns from abusers may therefore protect their other potential victims.
An IQR increase in concealed carry policies (strengthening 2 laws) was associated with a 5.7% decrease in workplace homicides. Some, but not all, prior research has revealed that when states or cities liberalize concealed carry permitting from "may issue" (in which local law enforcement can deny a permit even if a person has passed a background check) to "shall issue" (in which law enforcement does not have this discretion), firearm homicide rates increase.27 In addition to permitting, concealed carry regulations also dictate places in which people are allowed to carry a concealed weapon, including schools, colleges, houses of worship, bars, hospitals or medical facilities, prisons, and public sporting events.4 Each of these locations represents someone's workplace, as well as a public space. Therefore, changing policies to allow unrestricted concealed carrying of firearms in these settings may increase the risk of homicide for people who work there.
We also found associations between workplace homicides and strengthening of laws surrounding background checks, buyer regulations, dealer regulations, and limits on firearm trafficking, with effect sizes ranging from a 2.75% reduction (buyer regulations) to a 5% reduction (background checks). These policy changes may have been associated with decreases in workplace homicide by reducing gun ownership or the number of firearms in circulation; research has shown a positive relationship between state-level gun ownership rates and state-level homicide rates.28
We did not adjust for gun ownership, asit is likely a mediator of the relationship between the latter categories of firearm laws (background checks, buyer regulations, dealer regulations, and limits on firearm trafficking) and workplace homicide rates. Including this mediating factor in our models could have led to overadjustment and erroneous conclusions that the laws are ineffective.29 Furthermore, consistency between findings in these 4 policy domains as well as areas in which the observed associations are not plausibly driven by gun ownership (concealed carry permitting, child safety laws) suggests that the overall patterns revealed in our analysis are not solely attributable to ownership.
Strengthening of child safety policies was significantly, and unexpectedly, associated with decreases in workplace homicide rates. We hypothesize that an unintended effect of making firearms less accessible to children is that the same firearms are less accessible to theft or misuse by adults other than the original owner. Further research involving other data sets (e.g., individual-level data) will help elucidate potential mechanisms for such associations.
Strengthening of4 subcategories of firearm laws-possession regulations, assault weapon bans, preemption, and stand-your-ground laws-was not significantly (or nearly significantly) associated with reductions in workplace homicide rates. Not enough states changed assault weapon or preemption laws to allow us to test effects ofpolicy changes on workplace homicide rates (the IQR for both policy areas was 0). Both possession and standyour-ground regulations are tangential to workplace homicide risk factors. Possession regulations consist mostly of restrictions on gun ownership to individuals 18 years (or 21 years) and older and restrictions on guns at schools or colleges,4 but most working adults are older than 21 years and are not employed in educational settings. Stand-your-ground

defenses are typically invoked in conflicts occurring at someone's home, making them less relevant in a workplace context.

Limitations and Strengths

To protect the confidentiality of victims, CFOI provides data only by year and one other characteristic. Because our study design necessitated collecting data by state and year, we were unable to further stratify by other characteristics that could have been informative. These characteristics include events involving firearms versus other kinds of weapons and whether events involved one or multiple victims. With regard to the latter, 79% of workplace homicides during the study period were classified as shootings; nonshooting homicides likely contributed to random error and biased results toward the null. With respect to mass shootings, aggregate CFOI data reveal that only 5% to 8% of workplace homicides involve more than one victim, making mass shootings an unlikely driver of our results.30

Although the Centers for Disease Control and Prevention tracks nonfatal workplace injuries (including homicides) in a separate database, there is insufficient detail in publicly available surveillance data by state and year to capture physical and psychological morbidity related to nonfatal firearm injuries. This limitation is compounded by known underreporting of nonfatal workplace injuries.31

Other limitations relate to our study design. We used state-level policy changes and homicide rates; the ecological fallacy is therefore a threat to the validity of our findings. However, the majority of studies of firearm policies and homicide are ecological.6 We also cannot account for implementation; policies in some states may be more strictly enforced than policies in other states. Level of enforcement of firearm policies may be related to unobserved confounders at the state level.

Strengths of our study were 7 years of both policy and homicide data, the substantial amount of policy change activity over the study period, the lack of missing data, the use of a comprehensive policy assessment tool, the robust outcome measure, and the lack of conflict of interest that could come from funding by either gun-rights or gun-control entities. All of these factors have been identified as weaknesses of prior research on firearm policies and homicide.29

Conclusions

Our findings add to a growing body of evidence indicating that although firearm legislation cannot prevent every gun-related death, strengthening such policies is associated with reductions in homicide rates at a population level.6,9,10 Our effect sizes were modest, but the pattern we observed is consistent with the population approach to improving public health: small shifts in disease rates as a consequence of policy or practice changes can have a meaningful impact on population health over time.32 With the addition of this study, we have evidence that workplace homicides are another category of outcomes sensitive to changes in firearm policies.

Originally, smokingbans in restaurants and bars were implemented as an occupational health precaution for bartenders and servers.33 Over time, these policies were shown to benefit respiratory health not only among workers but also patrons.34 Following a similar model, unions, industry groups, and other worker advocates could lobby for more restrictive firearm policies at the state level to protect the health oftheir workforces and the lives of those they serve. Our findings suggest that strengthening the state-level firearm policy environment within our interquartile range (adding 20.5 firearm laws) would save, on average, the lives of 16 workers each year who would have died from workplace homicides, with further benefits extending to their families, coworkers, and employers.

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CONTRIBUTORS

E. L. Sabbath drafted the article and assembled the data. E. L. Sabbath and C. F. Baum designed the study. C. F. Baum analyzed the data. All of the authors contributed to interpreting the results and editing the article for intellectual content.

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CONFLICTS OF INTEREST

The authors declare no conflicts of interest.

HUMAN PARTICIPANT PROTECTION

No protocol approval was needed for this study because no human participants were involved.

Sidebar

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DETAILS

Subject:	Public health; Morbidity; Domestic violence; Time; Mortality; Regression models; Generalized linear models; Population density; Environmental legislation; Workplaces; Homicide; Firearm laws &regulations; Ecological monitoring; Statistical analysis; Trauma; Age; Confidence intervals; Stabbings; Firearms; Legislation; Murders &murder attempts; Databases; Workplace violence; Economic indicators; States; Gun violence; Health surveillance; Population growth; Classification; Ecological studies
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The Medical Marijuana Industry and the Use of "Research as Marketing"

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ABSTRACT (ENGLISH)

Marijuana and marijuana-based medical products are now legally sold in 33 US states and most European Union countries. Widespread medical marijuana legalization has ushered in an unprecedented level of investment in marijuana, replacing small, independently owned storefronts with polished national and international corporations. As the industry has become more sophisticated, so has its marketing; a recent commentary I coauthored in the Journal of the American Medical Association surveys Big Marijuana's marketing strategy and summarizes how Big Marijuana companies convey poorly substantiated health claims to potential consumers. This editorial is intended to highlight one particularly pernicious marketing technique commonly employed by Big Marijuana companies-a technique I call "research as marketing." Essentially, marketers realize that social media sites and the 24-hour news cycle effectively deliver health information to consumers and that consumers are less-discerning auditors of scientific rigor than are federal regulators. Therefore, rather than invest in the multitude of expensive, large-scale clinical trials required to make regulator-endorsed health claims, marijuana companies sponsor and publicize the results of less-robust studies. Using weak research in their marketing, marijuana companies may mislead consumers into conflating, for example, the value of evidence from a series of highly rigorous Food and Drug Administration (FDA) prescription drug trials with that from a correlational or ecological study. For example, in a post with the headline "The Role of Medical Cannabis in Managing Symptoms of PTSD [posttraumatic stress disorder]," multibillion dollar marijuana company Aphria cites a 25-participant imaging study to state "cannabinoid research suggests a link between endocannabinoid deficiencies and maladaptive brain changes after trauma exposures." Through authoritative-looking citations and biomedical jargon, consumers can be misled into believing that these relationships between marijuana use and health benefits are established scientific fact rather than budding theories. In addition to threatening the safety and autonomy of medical consumers, research as marketing has the potential to diminish the value of rigorous scientific research and undermine consumers' faith in medical sciences.

FULL TEXT

Marijuana and marijuana-based medical products are now legally sold in 33 US states and most European Union countries. Widespread medical marijuana legalization has ushered in an unprecedented level of investment in marijuana, replacing small, independently owned storefronts with polished national and international corporations.1 As the industry has become more sophisticated, so has its marketing; a recent commentary1 I coauthored in the Journal of the American Medical Association surveys Big Marijuana's marketing strategy and summarizes how Big Marijuana companies convey poorly substantiated health claims to potential consumers.

This editorial is intended to highlight one particularly pernicious marketing technique commonly employed by Big Marijuana companies-a technique I call "research as marketing." Essentially, marketers realize that social media sites and the 24-hour news cycle effectively deliver health information to consumers and that consumers are less-discerning auditors of scientific rigor than are federal regulators. Therefore, rather than invest in the multitude of expensive, large-scale clinical trials required to make regulator-endorsed health claims, marijuana companies sponsor and publicize the results of less-robust studies.

Using weak research in their marketing, marijuana companies may mislead consumers into conflating, for example, the value of evidence from a series of highly rigorous Food and Drug Administration (FDA) prescription drug trials with that from a correlational or ecological study.

For example, in a post with the headline "The Role of Medical Cannabis in Managing Symptoms of PTSD [posttraumatic stress disorder]," multibillion dollar marijuana company Aphria cites a 25-participant imaging study to state "cannabinoid research suggests a link between endocannabinoid deficiencies and maladaptive brain changes after trauma exposures."2 Through authoritative-looking citations and biomedical jargon, consumers can be misled into believing that these relationships between marijuana use and health benefits are established scientific fact

rather than budding theories. In addition to threatening the safety and autonomy of medical consumers, research as marketing has the potential to diminish the value of rigorous scientific research and undermine consumers' faith in medical sciences.

HEALTH CLAIMS BY ANY OTHER NAME

A major tenet of modern medical regulation is that health claims must be rigorously substantiated before they are disseminated to consumers. Rigorous standards set by regulatory agencies ensure that consumers make health decisions based upon only highly rigorous studies and protect them from being misled by less-robust evidence. However, research as marketing has enabled major marijuana companies to circumvent these regulations. By writing provocative articles on small-scale medical marijuana studies and disseminating them through online blogs, news sites, and social media sites, marketers convey health claims to consumers.

For example, Aurora, one of the world's largest marijuana companies, published a blog post citing an industry-funded, cross-sectional survey study to state "Medical cannabis patients report using CBD [cannabidiol] for a plethora of reasons, including to help with the symptoms of PTSD, anxiety, and pain."3 Consumers could easily mistake this for scientific evidence that CBD treats these conditions, despite the fact that clinical practice guidelines recommend against the use of CBD for mental health concerns or acute pain.4 Indeed, consumers who have been conditioned by the strict health claim regulations imposed on traditional pharmaceutical companies may assume that, for marijuana companies to make a claim, it must be rigorously backed.

EFFECTS ON RESEARCH AND SCIENCE

While the most immediate concern of research as marketing is to protect consumers, the detrimental effects that this marketing practice may have on medical research should not be ignored. Pharmaceutical companies invest in expensive and highly rigorous clinical trials required by regulatory agencies so that they can advertise their products with health claims. However, if companies can imply substantively similar health claims with clever framing of cheaper and less-robust research results (e.g., reporting an association and hoping that consumers will infer causation), that reduces their incentive to invest in more rigorous research.

The effects of these disincentives can already be observed. Major medical marijuana companies have not yet announced any plans to undergo the large-scale clinical trials required by federal regulators, even though medical research involving marijuana is fully legal in Canada and medical research involving CBD is now legal in the United States. Instead, these companies often invest in and widely publicize small-scale studies. For example, Canopy Growth, currently the largest marijuana company in the world, chose to invest just $2.5 million over 2 years to sponsor marijuana studies at the University ofBritish Columbia, a figure that pales in comparison with the average $2 to $3 billion cost to bring a product through the FDA approval process.5 Without more robust research, our understanding of these products' benefits and risks (e.g., addictive potential) may be severely limited.

Furthermore, research as marketing can degrade consumers' trust in the regulatory vetting process, thereby limiting the medical community's ability to use medical innovations to improve health and well-being. For example, all vaccines recommended by the FDA have undergone extensive clinical trials to demonstrate their limited risks. Still, the sensational publicity surrounding Andrew Wakefield's 12-participant observational study linking vaccines to autism convinced thousands of parents to dismiss established evidence and reject vaccines for their children.6 An investment in regulatory action against research as marketing may ensure that future medical innovations are adopted.

CALL TO ACTION

References to research in health product marketing is not new; previous studies have documented how companies (e.g., food, dietary supplement, nutraceutical, and cosmetic companies) have referenced inconclusive research in their advertisements and that consumers overestimate the scientific validity behind these claims.7 Federal regulators have taken steps to prevent this; for example, the FDA treats certain scientific citations on dietary supplement labeling as health claims, which are, in turn, subject to the FDA's strict standards for substantiation. However, these past concepts and related regulations are insufficient to address the present state of research as marketing for marijuana. For example, sophisticated marijuana corporations skirt existing regulations by separating their

advertisements and product labeling from blogging. While marijuana retailer MedMen does not cite academic studies on the "shop" section of its Web site, MedMen frequently reports on individual health studies in its blog.1 Dedicated marijuana regulators are needed to draw clear lines between what constitutes marketing and what constitutes free-press journalism in the marijuana industry.

Even barring marijuana companies from publishing the results of individual studies would likely still be insufficient to address research as marketing in today's concentrated marijuana market. Major marijuana companies are aware that news outlets often cover provocative study findings in support of marijuana, and they are large enough to reap the financial benefits of positive press. As a consequence, these companies may invest in small-scale or biased studies, relying on major news networks to publicize the studies' findings. To address this channel of research as marketing, regulators and journal editors should apply additional scrutiny to industry-funded studies, ensuring they can accomplish more than a compelling headline.

Direct-to-consumer research in the Big Marijuana era may mislead consumers into making ill-informed health decisions and undermines the regulatory process that incentivizes and vets robust medical research. Before more consumers are deluded and those marijuana companies interested in pursuing regulatory approval are driven out of the market, federal and international regulators must act to eliminate research as marketing in medical marijuana marketing, and the nuance of this marketing technique proves the need for equally sophisticated federal marijuana regulators to counter harmful marijuana marketing. Specifically, these regulators should be tasked with enforcing existing regulation on references to studies in marijuana marketing and drawing strict boundaries between free-press journalism and marijuana marketing. Journal editors and the press, aware ofthis underhanded marketing strategy, should apply additional scrutiny to industry-funded marijuana studies and resist widely publicizing preliminary results.

Sidebar

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CONFLICTS OF INTEREST

The author previously held a data analysis consulting contract with Smart Approaches to Marijuana (SAM), a public 501(c)(3) nonprofit organization. That contract was unrelated to the current work, and SAM was not involved in the current work.

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DETAILS

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Malaria Elimination Eff orts

Mugore, Matinatsa; Kalia, Vrinda; Lewandowski, Stephen A; Gaspard, Naomi

ProQuest document link

FULL TEXT

Suriname-part of the Guianas- is a malaria-endemic country in South America. It is committed to eliminating malaria by 2020 and has made monumental strides toward this goal. Researchers set out to examine trends of malaria diagnoses from 2000 to 2016. For Suriname to reach their 2020 goal, researchers suggest an increase in migrant health care to address the malaria incidents from "cross-border moving populations." Using Suriname's national malaria surveillance database, they found that malaria incidence decreased significantly (-95.6%) and that malaria-related hospitalizations and deaths decreased. Suriname's downward trend toward malaria elimination can be attributed to successful interventions such as improved surveillance, case management, and prevention.
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Puerto Rican Syndemics: Opiates, Overdoses, HIV, and the Hepatitis C Virus in a Context of Ongoing Crises

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College, City University of New York (CUNY), Long Island City [2] Department of Prevention and Community Health, George Washington University-Milken Institute School of Public Health, Washington, DC [3] The New School for Social Research and a Project Director at the Graduate School of Public Health and Health Policy, CUNY [4] Department of Sociology, University of Nebraska-Lincoln

ABSTRACT (ENGLISH)

Puerto Rico is undergoing serious political and socioeconomic crises. Before the recent political turmoil forcing the resignation of (now former) Governor Ricardo Rossello, massive government debt had already led to unrest because of unpopular austerity measures (e.g., pension cuts, shrinking public education, and hospital closures). Additionally, a decades-long financial crisis had already triggered large-scale emigration from Puerto Rico (a colony of the United States) to the continental United States, a phenomenon that was significantly augmented by Hurricane Maria in 2017. Puerto Rico's vulnerability to natural disasters is compounded with its adverse political and socioeconomic conditions to create an exceptionally unstable public health environment.

FULL TEXT

Puerto Rico is undergoing serious political and socioeconomic crises. Before the recent political turmoil forcing the resignation of (now former) Governor Ricardo Rossello, massive government debt had already led to unrest because of unpopular austerity measures (e.g., pension cuts, shrinking public education, and hospital closures). Additionally, a decades-long financial crisis had already triggered large-scale emigration from Puerto Rico (a colony of the United States) to the continental United States, a phenomenon that was significantly augmented by Hurricane Maria in 2017. Puerto Rico's vulnerability to natural disasters is compounded with its adverse political and socioeconomic conditions to create an exceptionally unstable public health environment.

Although 28 000 people who inject drugs (PWID) call Puerto Rico home,1 the island hosts only five syringe services programs (SSPs), which are poorly funded, and only six methadone clinics, which are at capacity, to serve 5500 PWID. Because of limited services, needle sharing and cooker sharing are normative behaviors among PWID in Puerto Rico.2 In fact, 48% of the 49 476 cumulative HIV/AIDS cases in Puerto Rico are PWID linked (42% injection drug use and 6% male-to-male sexual contact and injection drug use),3 and HIV prevalence among PWID in San Juan, the capital of Puerto Rico, is 13%.4

Puerto Rico also hosts one of the most hepatitis C virus (HCV)-vulnerable PWID populations of the United States and its territories. Hepatitis C prevalence among PWID in rural Puerto Rico is 79%, and it is as high as 90% in San Juan.5 Puerto Rico's Department of Corrections and Rehabilitation reports that there were 12 381 people incarcerated in 2015. Data gathered by the Department of Corrections and Rehabilitation from 12 074 of these individuals show that 11.17% suffered from substance use disorders while incarcerated.6 Injection drug use is rampant throughout Puerto Rico's prison system, and access to sterile injection supplies is nonexistent. Among PWID living with HIV in Puerto Rican prisons, many are coinfected with HCV. And yet, because of its outdated abstinence requirement for patients to access HCV treatment, the Puerto Rican government continues to deny HCV treatment to its PWID. It is, then, no mystery why HCV has reached a ubiquitous presence on the island.

Although fentanyl-laced heroin and cocaine fueled the rise of fatal overdoses in post-Maria Puerto Rico, we lack scientific understanding of fentanyl production and distribution in Puerto Rico, and overdose surveillance is not being conducted. Although naloxone (an overdose antidote) is available over the counter, the impoverished circumstances of Puerto Rico's PWID population likely requires distributing naloxone free of charge. Hence, it may be sound to provide SSPs (and prisons) with naloxone to expand access. Mirroring cities and states with large PWID populations in the United States, Puerto Rico's Department of Health could fund SSPs across the island. SSPs reduce HIV, HCV, and overdose risks more effectively than do faith-based and abstinenceonly programs, which do receive funds

from the local government.

By highlighting the overlapping (and interacting) epidemics (i.e., injection drug use, HIV, HCV, and opioid overdoses) fueling Puerto Rico's syndemic context, we seek to draw attention to structural determinants of disease and mortality that must be modified to save lives. Moreover, weak structural determinants of PWID's health cement their stigmatization and marginalization, which in turn affects timely uptake and adherence to HIV and HCV care, opioid agonist therapies, and overdose prevention. But we also seek to propose avenues for future research that are aligned with Puerto Rico's syndemic context.

First, we know fentanyl is present in the island's drug supplies, but we do not understand its advent and evolution. Although conducting overdose surveillance can help uncover the extent of the problem and also intelligently allocate prevention resources, identifying the structural factors behind the introduction (and maintenance) of fentanyl in Puerto Rico after Hurricane Maria is necessary to build a grounded response to what may be a prolonged problem.

Second, future HIV and HCV research should aim to gauge Puerto Rico's contextual complexity and assess disease syndemics in tandem with the island's sustained political, socioeconomic, and environmental (hurricane-prone Caribbean) instability. For example, it remains a mystery why HIV prevalence among PWID is relatively low in San Juan (13%) and in rural Puerto Rico (6%)4 when paraphernalia sharing inside and outside prisons is normative. Studies that have compared continental US-born PWID with PWID in Puerto Rico consistently show higher injection risk behaviors among PWID in Puerto Rico and among migrant PWID from Puerto Rico in New York City; these studies typically ascribe these findings to the lack of disease-prevention services, such as opioid agonist therapies and SSPs in Puerto Rico.2 These low HIV prevalence numbers among PWID in Puerto Rico may stem from PWID's everyday practices helping prevent HIV infection despite sustained injection paraphernalia sharing. In a context of increasing poverty, identifying these practices and understanding how they are maintained despite all the contextual disincentives to remain HIV safe may help save lives through their systematic dissemination.

A recent editorial in AJPH addressed the negative impact that the US law Puerto Rico Oversight, Management, and Economic Stability Act (2016) has over the economy and health of Puerto Ricans.7 It is also true that the Puerto Rican government could still significantly improve its efforts to prevent disease, death, and the structurally forced US-bound migration of PWID searching for services they lack in Puerto Rico.2 Science has conclusively shown that SSPs and opioid agonist therapies save lives (and governmental resources) by preventing infections. To save lives, the Puerto Rican government must start supporting evidence-based interventions: opioid agonist therapies, SSPs and the distribution of naloxone through SSPs, methadone clinics and prisons. Finally, the scientific community concurs that it is no longer medically sound to deny HCV treatment to PWID. We do not need more research on the efficacy of these interventions. They work. The data are conclusive. The political inertia costs lives. ÂfPU

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CONFLICTS OF INTEREST

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Sidebar

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DETAILS

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Public Health Is Not Afraid of Pleasure

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ABSTRACT (ENGLISH)

Public health need not be afraid of or distant from pleasure. It is not distant even when "public health" is narrowly defined as the institutions and organizations that nominally work for public health. Public health is even closer to pleasure when we consider the diverse and positive influences on health from entertainment, leisure, and artistic institutions and businesses and from many educational, sports, social, or environmental policies. Such influences also contribute to happiness, well-being, and many forms of pleasure. All are natural components of health.

FULL TEXT

Todo lo que me gusta es ilegal, / Everything I like is illegal,
es inmoral, o engorda. / it is immoral, or it fattens.
-Pata Negra

Does something in this Spanish flamenco blues song by the band Pata Negra ring true? Not necessarily the whole two lines, but some of their echoes? And not necessarily to you personally, but perhaps to someone you know or work for? Could these impudent words strike a chord with someone you know?

The words do not have to wholly apply to the composers of the song or to anybody. It is ancient and simple: behind the facade of literature and music, embedded in many artistic creations, there is often humor, irony, a bit of self-deprecation, and some truth.

Thus, you don't need to identify yourself with the lines literally. But as health professionals we do need to feel and to value- vaguely or clearly-the humor and the shreds of truth entwined in the fabric. The fabric of what? Of art. Of life. Wouldn't being totally insensitive to art and life entail an extreme degree of cognitive and emotional dissonance, prudishness, puritanism? On the other hand, wouldn't blindly embracing the words of the song be amoral, nihilistic? These psychological, cultural, and belief systems- puritanisms, nihilisms-do little good to public health, and most contemporary visions of health rightly involve the related but distinct experiences of joy, happiness, and pleasure.

Public health need not be afraid of or distant from pleasure. It is not distant even when "public health" is narrowly defined as the institutions and organizations that nominally work for public health. Public health is even closer to pleasure when we consider the diverse and positive influences on health from entertainment, leisure, and artistic institutions and businesses and from many educational, sports, social, or environmental policies. Such influences also contribute to happiness, well-being, and many forms of pleasure. All are natural components of health.

As public health people, we do value individual and collective pleasures-having fun with friends or family at a meal, parade, concert, game, marathon, hike. Such pleasures are sometimes present in AJPH articles. But we surely can consider more often and creatively the positive influences of pleasure on health and pleasure as part of health. One fruitful way to do so is through the arts. Another is by simply watching what our fellow beings express through their lives, at so many times, every day. ÂfPU

Sidebar

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Photo credit: Sonia Calvo / eldiario.es

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Assessing Global Health Care: The Lens of Disability

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ABSTRACT (ENGLISH)

The Missing Billion by Hannah Kuper and Phyllis Heydt is reviewed.

FULL TEXT

Assessing Global Health Care: The Lens of Disability

In their compact and accessibly written report The Missing Billion, Hannah Kuper and Phyllis Heydt argue persuasively for the inclusion of people with disabilities in achieving the United Nations' Sustainable Development Goal 3 (SDG 3) by 2030. SDG 3 aims to ensure healthy lives and promote wellbeing for all at all ages but, the authors note, mentions the word "disability" only once. This lack of engagement with disability, they argue, is representative of the ways in which "the missing billion," people with disabilities worldwide, have been left behind by health care policy. The Missing Billion is an important call to arms for the global health community because it reminds us that people with disabilities are too often overlooked in campaigns to improve public health.

Kuper and Heydt call for placing health care access and quality forpeople with disabilities at the center of assessment metrics for achieving improved global health. They argue for "universal design" approaches, to ensure that all health care products and services are accessible to the most people possible. In doing so, they highlight the important understanding that "[i]f a design works well for people with disabilities, it works better for everyone" (p. 7). This valuable, universalist perspective reflects the important insights of American sociologist and disability scholar Irving Kenneth Zola, who argued that the only effective long-term approach to supporting people with disabilities was to adopt the view that because all people are "at risk" for disability, everyone benefits from infrastructures that accommodate it.1 For instance, we all profit from interventions-such as elevators, ramps, and visual, tactile, and auditory cues-that make physical spaces more accessible.

PERSONIFYING DISABILITY

Kuper and Heydt refer to the estimated 1 billion people with disabilities as a large " 'cohort'/ vulnerable population" (p. 13), diverse in types of impairment and intersections with gender, age, and environment. To help describe this heterogeneous population, The Missing Billion focuses on five representative "personas" of people with disabilities. This approach allows identification of the many barriers that people with disabilities face in the social and health care arenas and their consequences for health, including misunderstandings and stigma from health care workers, lack of immediately accessible providers and services, and an absence of community support systems and transportation options.

The authors emphasize the heterogeneity of people with disabilities. Thus, the five personas are a man with intellectual disabilities, a child with a hearing impairment, a woman with a physical disability, a woman with a visual impairment and HIV, and a girl born with Zika syndrome. The authors follow each of these personas as they attempt to acquire health services and encounter challenges. For instance, the boy with a hearing impairment struggles in school. Finding an audiologist proves very difficult for his father because the nearest hospital is eight hours away. Ultimately, the boy receives a hearing aid, but it soon stops working. This medical device proves both difficult to acquire and difficult to maintain, revealing the struggle to access health care.

At times, the authors' approach to disability is overly narrow. For example, their story ofthe boy with impaired hearing does not consider other social or educational arrangements beyond medical interventions that could support his learning and contribute to his quality of life.

BEYOND HEALTH

The primary recommendation of The Missing Billion is to include people with disabilities in the SDG 3 action plan and assessment. This is an important goal, but only ifit is considered in a broader context. The United Nations defined a total of 17 SDGs in 2015, including efforts in many other areas that would directly and uniquely benefit

people with disabilities, such as ending poverty, providing a quality education, and improving decent work opportunities. Kuper and Heydt acknowledge that all of the SDGs are linked and must be achieved. As they put it, "Ifpeople with disabilities do not achieve good health, then they are less likely to get a good education (SDG 4) or be able to earn a living wage (SDG 1)" (p. 7).

The authors assume a direct causal link between disability and poor health by implying that "good health" is a prerequisite for quality education or job opportunities. But this need not be the case. Other SDGs seek to create the opportunity for a quality education and a living wage for all people, independent of their disability or health status. Linking disability to health, and then health to educational and economic success, has the effect of deemphasizing, or questioning, the direct and often primary significance of other SDGs in improving the lives of people with disabilities.

The frequent assumption by the World Health Organization and other global advocacy and support groups that disability is primarily a health issue has been widely criticized by disability scholars and advocates as part of their larger critique of the "medical model" of disability.2 In his 2003 review of the World Health Organization's International Classification of Functioning, Disability, and Health, British disability scholar Colin Barnes lamented that, "[w]ithin this framework, disability remains a health rather than a political concern."3 Along similar lines, disability scholar Tom Shakespeare, a member of the steering committee for The Missing Billion, argued in 2009 that "[h]aving a disability is not incompatible with being healthy. "4(p1815) Many disability scholars and advocates prioritize political change as necessary before health interventions.

The Missing Billion also highlights the stigma and misunderstandings that people with disabilities often face from health care workers. According to Kuper and Heydt, greater awareness among health care professionals, including improvements in their education, is a desirable aim. They also note the value of people with disabilities participating in improving the quality of health care services. A related goal should be to train and support more people with disabilities to become health professionals.5 As Tom Shakespeare put it, "Learning alongside a student who is a wheelchair user or has restricted growth or is deaf can challenge negative assumptions directly, as well as broaden the pool of qualified people entering the health professions. "4(p1816)

Kuper and Heydt deserve praise for arguing that a greater focus on the accessibility and quality of health care for individuals with disabilities must be a central goal and foundational metric for assessing SDG 3. Because people with disabilities are marginalized, stigmatized, and disproportionately impoverished worldwide, measurable improvements in their health care would be evidence of enhancements in the health care system as a whole. The authors' defense of this argument, using personal stories and population data, makes The Missing Billion a major accomplishment. Although health is an important component of policies and practices that respond to disability, change must begin with political, social, economic, and educational considerations and services that should be addressed independently of "good health." ÂjPU

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CONFLICTS OF INTEREST

The authordeclares no conflicts ofinterest.

Sidebar

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A Call for (Renewed) Commitment to Sexual Health, Sexual Rights, and Sexual Pleasure: A Matter of Health and Well-Being

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ABSTRACT (ENGLISH)

In this charged political moment, and despite all efforts to the contrary, the public health community must take on, and not shy away from, a rights- and pleasure-affirming concern for sexual health and well-being. This is recognizably no small task. Failing to recognize that some of the primary factors behind sexual health risk are in fact issues that relate to sexual rights, desire, and pleasure, the global and national policy and programmatic standards that do exist, as well as the sexual health programs in place in most of the world, still primarily tend to address the negative consequences associated with sexuality, such as the prevention of unintended pregnancies, HIV, and sexually transmitted infections.

FULL TEXT

In this charged political moment, and despite all efforts to the contrary, the public health community must take on, and not shy away from, a rights- and pleasure-affirming concern for sexual health and well-being. This is recognizably no small task. Failing to recognize that some of the primary factors behind sexual health risk are in fact issues that relate to sexual rights, desire, and pleasure, the global and national policy and programmatic standards that do exist, as well as the sexual health programs in place in most of the world, still primarily tend to address the negative consequences associated with sexuality, such as the prevention of unintended pregnancies, HIV, and sexually transmitted infections.

POLITICS, EFFECTS, AND PROGRAMMING CONCERNS

Sexual pleasure is a difficult topic for many to address openly, including some within the public health community,

even though the links between sexual health and sexual pleasure have long been understood. Around the world, the failure to approach sexual health comprehensively from its very roots and intersections with pleasure, sexuality, and sexual rights has had very real and negative consequences. The pathways to how individuals seek and enjoy sexual pleasure are complex and bring into play larger economic, social, cultural, political, and structural issues that go beyond the typical responsibilities ofa health provider. This has implications not only for public health programming and service delivery but also for law and policy and, ultimately, for how people relate to their own bodies, establish relationships, and exist in the world.

In the face of new and reemerging challenges, including ideological attacks against gender equality, sexuality, reproductive freedom, and self-determination, as well as growing nationalism and populism, increased conservatism, and the larger geopolitics around the world, the standards set in 1994 at the International Conference on Population and Development (ICPD) are emerging as a key touchstone for improving (or at least holding the line on) sexual health around the world.1 At the 1994 International Conference on Population and Development, 179 governments adopted a Programme of Action that recognized the role that reproductive health and gender equality play in the pathway to sustainable development. The adoption of the ICPD Programme ofAction was a critical step in moving population concerns away from demographic targets and toward equality and rights-affirming policies and programs, but it was limited in its vision of sexual health, let alone rights and pleasure. Adopting this Programme of Action required political compromises, resulting in sexual health being affirmed within the larger rubric of reproductive health, no mention of pleasure, and the acceptance of the concept and language of reproductive rights rather than sexual rights more generally. A spate of international commitments have followed, more or less based on these initial approaches to sexual health, including the Beijing Fourth World Conference on Women, and today the world is aiming to achieve the United Nations Sustainable Development Goals by 2030, with universal sexual and reproductive health noted as central to much of this agenda.2-4

Although there is a cursory nod now and again to the role of sexual rights in many international fora, the irony of the current importance of these commitments is that despite evidence of the magnitude of pleasure and rights to sexual health, none has been explicit in addressing pleasure in the context of sexual health or within the broader agenda of health and development. This not only creates "rhetorical problems" but also has had major implications for the targets and indicators set through the Sustainable Development Goals process, the type of data collected by countries in relation to their commitments, and ultimately which programs are funded and in place.

Most lawmakers and policymakers, program managers, and health service providers are not prepared to address the complexity of sexual pleasure or to address the diverse ways in which sexual pleasure is experienced at different points of life (adolescence, adulthood, and older age) or among different populations. The public health community therefore has an important role to play. The World Association for Sexual Health (WAS) has, since 2008, recognized sexual pleasure as a component of holistic health and well-being. After several years of work, the WAS adopted a World Congress of Sexual Health Declaration on Sexual Pleasure in October 2019.5 Although the WAS is a professional organization, this declaration, which is circulating widely, may bring a fresh approach to public health spaces and to what governments can be encouraged to understand as their responsibilities for sexual health, despite the larger geopolitical constraints mentioned earlier. Most important, and with concrete examples, the declaration explicitly calls for an intersectional, interdisciplinary, and multisectoral approach to research, programs, service delivery, and advocacy that fully takes into account the links between sexual health and sexual rights and pleasure.

A WAY FORWARD

We need to ensure in our own research, programming, service delivery, and activism in sexual health that we pay attention to pleasure and sexual rights for all people, including adolescents; sex workers; those living with HIV; lesbian, gay, bisexual, transgender, and intersex individuals; refugees or internally displaced persons; persons with disabilities; religious or ethnic minorities; or any combination thereof.A potential first step may be to begin mapping the cases in which sexual health, rights, and pleasure have been successfully brought together conceptually and operationally with documented effects on people's sexual health in all parts of the world, as well as those cases in

which gaps have resulted in limitations on sexual rights and pleasure. Attention needs to be given to the diverse and contextual ways through which individuals exercise choice and privacy; enjoy dignity, nondiscrimination, and safety; receive information; and experience sexual pleasure. An intersectional understanding of sexual health, sexual rights, and sexual pleasure within a broader public health agenda reminds us that we need to pay attention to laws and policies, not just programs and service delivery. The law can be positive and supportive, such as when it makes comprehensive sexuality education available, but it also can be harmful, such as when it does not allow adolescents or married women to access sexual health services without parental or spousal consent, respectively. With respect to service delivery, a great deal of education and other work must be done to move the profession beyond simply addressing the negative consequences of sexual behavior but actually addressing sexual pleasure as an integral part of sexual health.

Focusing on sexual rights and pleasure for all people, beyond simply, of course, the need to engage in good science, is a matter of prudence to all our work. It is not a luxury or a distraction. For the public health community to move the needle on sexual health will require not only moving beyond pathologizing and negative approaches but also bringing explicit, positive, and affirming attention to sexual rights and pleasure. Â1PU

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Sidebar

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Vulnerability of Renters and Low-Income Households to Storm Damage: Evidence From Hurricane Maria in Puerto Rico

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ABSTRACT (ENGLISH)

Objectives. To identify disparities in home damage from Hurricane Maria among Puerto Rican households with different housing tenure and income levels. Methods. Using household inspection data obtained by the Federal Emergency Management Agency (FEMA), including an ordinal damage severity measure, we used generalized ordered logistic regression to estimate the relative risks of damage severities between renters and homeowners, and between households with different incomes. Results. With respect to the FEMA damage-severity classifications of "minor," "major," and "destroyed," renters were more at risk than homeowners for both "major-or-destroyed" and "destroyed" outcomes. Similarly, lower-income households were at greater risk for both "major-or-destroyed" and "destroyed" outcomes. When we allowed for an interaction between income and housing tenure, the difference in risk of "destroyed" outcomes between renters and homeowners was substantially greater at lower income levels. Conclusions. These results provide evidence at the individual household level that renters and lower-income households are most vulnerable to hurricane damage. Our interaction results suggest that lower-income renters are particularly vulnerable to severe home damage. Public Health Implications. Disaster preparedness policies should raise structural standards for low-income housing to reduce risks of severe damage. (Am J Public Health. 2020;110:196-202. doi:10.2105/AJPH.2019.305438)

FULL TEXT

Headnote

Objectives. To identify disparities in home damage from Hurricane Maria among Puerto Rican households with different housing tenure and income levels.

Methods. Using household inspection data obtained by the Federal Emergency Management Agency (FEMA), including an ordinal damage severity measure, we used generalized ordered logistic regression to estimate the relative risks of damage severities between renters and homeowners, and between households with different

incomes.
Results. With respect to the FEMA damage-severity classifications of "minor," "major," and "destroyed," renters were more at risk than homeowners for both "major-or-destroyed" and "destroyed" outcomes. Similarly, lower-income households were at greater risk for both "major-or-destroyed" and "destroyed" outcomes. When we allowed for an interaction between income and housing tenure, the difference in risk of "destroyed" outcomes between renters and homeowners was substantially greater at lower income levels.
Conclusions. These results provide evidence at the individual household level that renters and lower-income households are most vulnerable to hurricane damage. Our interaction results suggest that lower-income renters are particularly vulnerable to severe home damage.
Public Health Implications. Disaster preparedness policies should raise structural standards for low-income housing to reduce risks of severe damage. (Am J Public Health. 2020;110:196-202. doi:10.2105/AJPH.2019.305438)
(ProQuest: ... denotes formula omitted.)
Hurricane Maria, one of the most devastating hurricanes in Puerto Rican history, made landfall in September of 2017 with sustained winds of 160 miles per hour and extensive flooding, resulting in close to 3000 fatalities.1,2 According to the Centers for Disease Control and Prevention,2 deaths and injuries in such natural disasters are often attributable to housing damage, especially by collapsed housing structure and flying debris. In the case of Puerto Rico, Hurricane Maria damaged more than 300 000 homes, almost a third of the total housing stock.3
In this context, we sought to identify the characteristics of those surviving households most affected by this damage. Existing literature suggests that housing damage from natural disasters is more prevalent in areas with higher proportions of renter households or low-income households. But studies to date have for the most part addressed these questions at the community level (including studies at the census-tract level,4 zip-code level,5 neighborhood level,6,7 and planningdistrict level7). In addition, previous studies have for the most part looked only at overall damage prevalence and not degrees of damage severity. For example, Chakraborty et al.8 focused on the areal extent of Hurricane Harvey-induced flooding across census tracts in Houston, Texas. But for the case of Hurricane Maria, data collected by the Federal Emergency Management Agency (FEMA) in Puerto Rico3,9 has made it possible to identify both housing characteristics and levels of damage severity suffered by individual households. Using these data, our primary objectives were 3-fold. First, we sought to determine the vulnerability of individual renter households versus homeowners with respect to damage severity. Second, we analyzed the vulnerability of lower- versus higher-income households with respect to damage severity. Finally, we looked for possible relations between these 2 sets of results. More specifically, given the finding by US Department of Housing and Urban Development3 that the incomes of renter households in Puerto Rico tend to be lower than for homeowners, together with the historical persistence ofincome inequalities in Puerto Rico,10 we sought to determine whether such income inequalities have contributed to a higher vulnerability of renter households with respect to damage severity.
METHODS
This study was based on the Individual Assistance Housing Registrants file for major disasters published by FEMA,8 which includes both housing and household characteristics for 740 000 individual homes inspected by FEMA. Of these homes, the 306 126 units found to be directly damaged by Hurricane Maria constitute our basic study population.
Specification and Measurement of Variables
Outcome variable. Our primary outcome variable for this study was severity of home damage. This ordinal variable is defined by FEMA3,11 to consist of 3 levels of damage severity: "minor damage" (designated as "moderate damage" in certain FEMA documents), "major damage," and "destroyed." More specifically, minor damage involves a real property FEMA-verified loss of less than $17 000; major damage involves a real property FEMA-verified loss ofat least $17 000; and destroyed involves damage that is "not economically feasible to repair." (Damage maps based on these data are provided in Figure 1 and Figure A, available as a supplement to the online version of this article at http:// www.ajph.org.)
Covariates. Our selection of relevant covariates included both housing attributes and household attributes. The

housing attribute of most interest for our purposes was residential type, designated by FEMA as a nominal variable with 6 categories: "apartment," "house/duplex" (here referred to as "house"), "townhouse," "condo," "mobile home," "trailer," or "boat." Our interest in this variable was motivated by existing literature relating residential types to household characteristics.12-14 In particular, renters and households with comparatively lower income (hereafter lower-income households) tend to live in certain housing types-most notably in apartments12 as confirmed for our data in Table A (available as a supplement to the online version ofthis article at http://www.ajph.org). Our second housing attribute related to the type of damage (rather than severity of damage) inflicted by Hurricane Maria and was of interest for our purposes because of its possible relation to damage severity. This nominal "damage type" variable is classified to be either "flood damage" or "wind damage." Here it should be noted that FEMA only asked residents whether the damage was caused by flooding. But because wind damage together with flood damage were by far the most common types of damage from Hurricane Maria,15,16 we have chosen to employ this dichotomous interpretation.

Turning next to household attributes, our 2 most important attributes (as mentioned in the introduction) were household income and housing tenure. Household income is a continuous variable indicating the annual income level before the disaster, as reported by household. Housing tenure is also a dichotomous variable with values of "1" for renter and "0" for homeowner. In addition to these primary attributes, we included a dichotomous variable, large-size household, with value "1" if the reported size of the household was greater than 3 (rounded from the average size, 2.98, based on census data for Puerto Rico in 2000). Our primary interest in household size was its well-known positive relation to household income (as, for example, in the household size-income tabulations for Puerto Rico17,18).

Statistical Analyses

We first used a 2-way cross-tabulation (with the Pearson %2 test) and 1-way analysis of variance (with F-statistic) to compare relevant household characteristics to the severity oftheir home damage, as presented in Table 1. These results are further articulated in Table 2 and Table B (available as a supplement to the online version of this article at http://www.ajph.org), where we employed generalized ordered logistic regressions to estimate the risk of relative damage levels incurred by these household groups. A typical model is illustrated here, where Y¡ denotes an ordinal damage variable for household, i = 1, n, with outcomes, j = 1,2, 3 = ("minor," "major," "destroyed"), and where variables (хц, X2i, ⅝) represent the relevant characteristics of household, i:

... (1)

In particular, P(Y¡ 1) denotes the probability ofa major-or-destroyed outcome, and P(Y¡ 2)denotes the probability ofa destroyed outcome. (These observed outcomes are mapped in Figure 1 and Figure A, available as a supplement to the online version of this article at http://www.ajph.org.)

Within this general modeling framework, we considered both simple regressions allowing the effects of each covariate to be analyzed separately (as in Table B) and multiple regressions including all covariates (as in Table 2). Here we first tested the main effects of both housing tenure and income, and then allowed for a possible interaction effect between them. We carried out all analyses by using the Stata 15 software package (StataCorp LP, College Station, TX) where, in particular, we employed the GOLOGIT2 model for all regressions.19,20

Finally, the only noteworthy missing data in our sample were with respect to reported income levels of households, for which 12% ofvalues were missing. Here we adopted the list-wise deletion method, which reduced our study sample from 306 126 to 267 989 for the regression analyses in Table 2 and Table B. But to check for possible bias, we also applied multiple-imputation procedures using the full sample to these regressions (as discussed at the end of the next section).

RESULTS

Among the 306 126 homes in Puerto Rico that were damaged by Hurricane Maria, we see from Table 1 that more than 13 000 suffered major-or-destroyed damage. Among these homes, our major finding is that renters suffered substantially more damage than homeowners. Even though renters constituted less than 8% of the primary residents experiencing structural damage, nearly two thirds (66%) of the 8802 homes suffering major damage were

renter-occupied. Moreover, the percentage ofrenter-occupied homes destroyed was 4 times that of owner-occupied homes (4.8% vs 1.2%). These figures are almost as dramatic for mean incomes of households across damage levels.

In particular, the mean income ofhouseholds suffering destroyed outcomes ($14 013) was less than half that for minor damage outcomes ($30 933).

Our logistic regression results in Table 2 together with Table B add further detail to these findings. First, the ordered logistic regressions in Table B help to clarify the relative risks of both major-or-destroyed outcomes and destroyed outcomes among these household groups. With respect to renters versus homeowners, there was a significantly greater risk of major-or-destroyed outcomes for renters (odds ratio [OR] = 17.53; 95% confidence interval [CI] = 16.85, 18.23) and to a somewhat lesser extent, a greater risk of destroyed outcomes for renters (OR = 4.10; 95% CI = 3.82, 4.41). The results for household income also show that lower-income households were at significantly greater risk of damage. In particular, lower-income households were at greater risk of destroyed damage (b = -1.64e-06; 95% CI = -2.29e-06, -9.86e-07) compared with major-or-destroyed damage (b = -9.44e-07, 95% CI = -1.28e-06, -6.07e-07).

Our main results in Table 2 involve simultaneous analyses of both housing tenure and income effects, while we controlled for the additional effects of residential type, family size, and damage type. Turning first to the main effects model in Table 2, we see that renters continued to be at significantly greater risk of damage than homeowners. More specifically, even when we controlled for the effects of income levels (along with all other effects), renters continued to be at greater risk than homeowners both with respect to major-or-destroyed outcomes (OR = 19.76; 95% CI = 18.95, 20.61) and destroyed outcomes (OR = 5.00; 95% CI = 4.64, 5.39). Similarly, the qualitative results in Table B with respect to household income continued to hold when we controlled for the effects of housing tenure (and other variables; i.e., lower-income households continued to be at greater risk both with respect to major-or-destroyed outcomes [b = -3.61e-07; 95% CI = -5.64e-07, -1.57e-07] and destroyed outcomes [b = -1.33e-06; 95% CI = -2.03e-06, -6.24e-07]).

Turning to other control variables, it is of interest to observe that for residential housing types there was a dramatic reversal in the coefficient sign for relative damage risks of apartments versus houses. In particular, houses were now at significantly greater damage risk than apartments, both with respect to major-or-destroyed outcomes (OR =1.62; 95% CI= 1.50, 1.76) and destroyed outcomes (OR = 1.61; 95% CI = 1.38, 1.88). Here the key difference from Table B is that we were now controlling for the effects ofhousing tenure. As shown in Tables C and D (available as supplements to the online version of this article at http:// www.ajph.org), renters were far more likely to occupy apartments than were homeowners, so that much of the damage risk for apartments was now being captured by their renter occupants. Similar results can be seen for both damage type and family size. With respect to damage type, for example, the simple regressions in Table B show that the risk of major-or-destroyed outcomes was higher for flood damage than wind damage (OR =1.12; 95% CI = 1.04,1.20). But when we controlled for the effects of housing tenure, as in Table 2, it is seen that such risks were reversed (OR = 0.71; 95% CI = 0.66, 0.76). This is again partly explained by the result in Table D, which shows that renters are far more likely to suffer flood damage than wind damage (OR = 2.19; 95% CI = 2.09, 2.29). Thus, much of the risk of major-or-destroyed outcomes associated with flood damage was again being captured by those renters suffering flood damage.

In our final interaction effects model, we included an interaction term to analyze the possible influence of household incomes on relative damage risks between renters and homeowners. Here we found that for both major-or-destroyed and destroyed outcomes the differences in risks between renters and homeowners were substantially greater for lower-income households (b = -6.47e-06; 95% CI = -0.000012, -8.97e-07). Here it should also be noted that a likelihood ratio test between the nested models-main effects and interaction effects-shows that the presence of this interaction terms did indeed yield a significantly better fit (%2 = 9.57; P< .01).

These relations can also be seen graphically in terms ofmarginal-risk analysis with respect to the interaction effects model. In particular, the marginal risks of destroyed outcomes for both renters and owners at selected income percentile levels are shown in Figure 2 (where, for example, the marginal risk for renters at the 95th percentile

income, say X95, is just above 0.04, and obtained as the mean predicted risk over all individual sample profiles evaluated at tenure = "renter" and income = X95). In a manner similar to the interaction results in Table 2, the differences in income effects between renters and owners were quite dramatic. In particular, as seen from the CIs in this figure, these differences were substantially greater at low income levels. The average marginal risks for renters and owners are also reported in Table E (available as a supplement to the online version of this article at http://www.ajph. org). Here it is seen that while renters were on average less likely to suffer minor-damage outcomes than homeowners, they were 6 times more likely to suffer destroyed outcomes.

Finally, it must be emphasized that while the results in Table 2 and Table B were based on the list-wise deleted subsample of those 267 989 households reporting income, all these results continued to hold (in a qualitative sense) for multiple-imputation analyses of the full sample of 306 126 households. These full-sample results, based on a mean of 20 imputations of income, are reported in Table F (available as a supplement to the online version of this article at http:// www.ajph.org). The similarity between these findings is further supported by the missing-data analysis in Table 1, which shows that while our large sample sizes yielded statistically significant differences between damage levels for missing and nonmissing income subpopulations, the percentage profiles of damage levels for these subpopulations were actually quite similar (as shown in Figure B). Qualitative similarities between the housing-tenure profiles of these subpopulations can also be seen in Figure C (available as a supplement to the online version of this article at http://www.ajph.org).

DISCUSSION

Our findings at the individual household level are consistent with the community-level findings of others with respect to greater damage risk of both renters versus homeowners and lower- versus higher-income households. Our results add further detail not only in terms of individual household comparisons but also in terms the relative degree of damage severity. For example, Logan7 found that neighborhoods in New Orleans, Louisiana, with higher percentages of renters tended to suffer higher frequencies of home damage from Hurricane Katrina. Similarly, Kamel5 found that zip code areas in New Orleans with higher percentages of low-income households also suffered greater housing damage (in dollar terms). In addition, Chakraborty et al.8 found at the census tract level that the aerial extent ofHarvey-induced flooding was associated with socioeconomically deprived residents. But whether income or housing tenure are related to more severe damage at the individual household level cannot be determined by such aggregate analyses.

It should be noted, however, that there do exist previous studies at the individual level that have analyzed relations between hurricane damage and household characteristics. With respect to the effects ofhousing damage on individuals, several studies have focused on the mental health impacts of such damage.21,22 Closer to our work are studies of individual household characteristics associated with degrees of housing damage.23,24 But these studies have for the most part focused on racial differences rather than on renters versus homeowners and have employed income only as a control variable in studying such differences.

Finally, we turn to the key finding of our interaction-effects model that the relative risk of destroyed outcomes between renters and homeowners was significantly influenced by household income levels. The main reason for this appears to be the interrelation between housing tenure, household income, and vulnerability to wind damage. First, the more detailed regression of income quantiles on housing tenure in Table G (available as a supplement to the online version of this article at http://www.ajph.org) shows that there was a general downward shift in the distribution of renter incomes relative to homeowner incomes (with respect to those incomes reported by households). Second, as reported, for example, by Eaton,25 there is also a general tendency for low-income housing to be more vulnerable to hurricane-force wind damage. Third, our FEMA data show that almost 99% of all homes destroyed were because of wind damage rather than flood damage (Table 1). Taken together, these findings suggest that low-income renters were particularly vulnerable to destroyed outcomes. This is further supported by the fact that while renters generally suffered relatively more flood damage than homeowners (Table D), this situation was reversed for destroyed outcomes, for which renters were 4 times more likely to suffer wind damage than were homeowners (5.50% vs 1.28%, as shown in Table H, available as a supplement to the online version of this article at http://

www.ajph.org).

It should also be noted that our study was not without limitations. Perhaps most important for our present purposes is the dollar-based threshold between "major damage" and "minor damage" used by FEMA to define their measure of damage severity. This $17 000 threshold necessarily involves a different level of relative damage severity for say a $30 000 home versus a $300 000 home. Thus, when attempting to relate damage severity to household incomes, it is desirable to employ measures of damage more directly related to home value. Finally, the decision of what constitutes "not economically feasible to repair" may involve more subtle types of observer bias related to perceived financial resources of households and their ability to repair- which might inflate the percentage of low-income households with destroyed outcomes.

In addition, it should be noted that certain groups of hurricane victims may in fact be underrepresented in the present set ofFEMA Individual Assistance Housing Registrants. Of particular concern are low-income renters not meeting the requirement of FEMA's housing assistance program that applicants have "stable housing" accommodations before disasters.26 (In this regard, it has been estimated that as much as 50% of all housing construction before Maria was substandard and in violation of existing codes.27) More generally, low-income households tend to be less comfortable in "negotiating with disaster recovery bureaucracies,"28 and may often encounter more obstacles (e.g., lack of transportation or child care) in doing so.29 Thus, there are reasons to speculate that lower-income renters suffering destroyed outcomes from Hurricane Maria may be underrepresented in our study.

But, in spite of such limitations, this study represents (to our knowledge) the first effort to identify the characteristics of individual households suffering most from Hurricane Maria. These findings not only provide more detailed confirmations of the more aggregate results mentioned previously but also are consistent in spirit with a number of policy efforts currently under way to provide safer storm-resistant housing for low-income households in Puerto Rico (including expansions of both local land-grant programs27 and the Low-Income Housing Tax Credit program for Puerto Rico30). So we believe that our findings may serve to provide additional substantive support for these efforts.

CONTRIBUTORS

C. Ma initiated and conceptualized this research project, conducted the literature review, formulated the research questions, designed the study method, analyzed the data, and wrote the article. T. Smith mentored the study, including the overall formulation and statistical rigor of the analyses as well as the edits of the article.

CONFLICTS OF INTEREST

The authors have no conflicts of interest to report.

HUMAN PARTICIPANT PROTECTION

In this study, we used secondary data from the Federal Emergency Management Agency, which are publicly accessible on its Web site. It is our understanding that no documentation of an ethics approval procedure is required for such data.

Sidebar

ABOUT THE AUTHORS

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DETAILS

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A Public Health Perspective That Could Shape the Thinking of Many

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ABSTRACT (ENGLISH)

The health of individuals is largely outside their control. Genetics play a large role, and the actions of those genes are often initiated by external forces that can originate before birth. Health outcomes are often attributed to behavioral choices, but even these choices are greatly influenced by the environment in which people live. Political, economic, and social forces influence the environment, thereby influencing our every choice. This is the basic understanding of the social determinants of health and the foundation of Well: What We Need to Talk About When We Talk About Health by Sandro Galea. On this foundation, Galea builds a compelling argument that the focus on health care observed in the United States is misguided and misses many of the upstream factors that cause ill health that we as a society could address and ignores other influences (such as luck) that are beyond our control. As Galea succinctly states in the introduction: [O]ur health is not defined by things like seeing doctors or taking medicines or getting in our 5,000 steps a day. Rather, it's defined by the full spectrum of our life circumstances, from the families we come from to the neighborhoods where we live to the people we see and the choices we make. And unless we understand those forces, our health is never going to improve.

FULL TEXT

The health of individuals is largely outside their control. Genetics play a large role, and the actions of those genes are often initiated by external forces that can originate before birth. Health outcomes are often attributed to behavioral choices, but even these choices are greatly influenced by the environment in which people live. Political, economic, and social forces influence the environment, thereby influencing our every choice. This is the basic understanding of the social determinants of health and the foundation of Well: What We Need to Talk About When We Talk About Health by Sandro Galea. On this foundation, Galea builds a compelling argument that the focus on health care observed in the United States is misguided and misses many of the upstream factors that cause ill health that we as a society could address and ignores other influences (such as luck) that are beyond our control. As Galea succinctly states in the introduction:

[O]ur health is not defined by things like seeing doctors or taking medicines or getting in our 5,000 steps a day. Rather, it's defined by the full spectrum of our life circumstances, from the families we come from to the neighborhoods where we live to the people we see and the choices we make. And unless we understand those forces, our health is never going to improve. (p.xv)

PULLING BABIES FROM THE RIVER

As the parable referenced in Well goes, a villager is walking by a river and sees a person floating down it. The villager quickly pulls the drowning person out of the water only to see a second and a third person floating in the river. She alerts her fellow villagers who spring into action saving people. Their work is admirable but does not address the root cause of the epidemic: a giant ogre who is throwing the people into the river upstream. In Well, the ogre is given many faces in the form of power, place, and politics among others. However, just like a mighty ogre, these forces are not inherently bad, but they are strong and difficult to overcome when directed to the wrong ends. In Well, Galea catalogs and describes many of the usual suspects (e.g., economics, education) but also makes a solid case for some less discussed forces, such as love, hate, and compassion. Here the book loses some momentum as a call to action because forces such as income, education, and the environment are somewhat under collective control through policy change. However, it is impossible to legislate compassion or love (for example).

Although Well is effective in introducing the myriad forces that shape the health of people, few solutions are presented to address them. For example, Galea suggests "moving beyond expressions of empathy or isolated acts of charity to tackle the true causes of their poor health" (p. 86) but stops short ofsuggesting how society can motivate these suggested actions.

FISH IN WATER

One of the more welldelivered analogies in Well tells of fish swimming in water unaware that the water even exists. The fish, like many humans, do not notice or acknowledge their environment, although its influence on their health is undeniable. As Galea points out, you can have two fish in a bowl that engage in healthy behaviors (e.g., good diet, plenty of physical activity), but they will still perish if the water is not changed regularly. This analogy sets the table for a later discussion of opportunity and personal responsibility, when Galea makes an excellent point about the fallacy of comparing the efforts of individuals when you are unaware of the obstacles in their path.

Combining these two points brings up my favorite analogy (as someone from working-class roots) for those born into (unacknowledged) privilege who later go on to achieve great things. People often say that these individuals were "born on third base and think they hit a home run. " The person has put in some effort and advanced from third base to home. This would amount to hitting a single base hit. Had the person started from home (an analogy for poverty) and put in equal effort, he or she would be only on first base. Toa spectator seeing the results, the first person (born on third) is the most accomplished, when in reality, both players produced the same result (a single base hit). This is how privilege (broadly defined) can evade perception (the water) while still influencing the outcome and in many cases influence the degree ofpraise given to those from privilege and the level of compassion given to those from less privilege.

FINDING AN AUDIENCE

I enjoyed Well and found it an easy read; however, I believe that Galea's intended audience extends beyond the scientific community to which I belong. Having worked in public health for more than 20 years, I enjoyed exploring

the concepts in the book from a new perspective but did not encounter much that has not become self-evident after two decades in the field. However, I suspect that this is not the perspective ofthe average reader. Ultimately, it will be interesting to see if Galea's words find the audience that most needs to read them-specifically, those who view all success and failure as personal responsibility or lack thereof and those who think access to health care alone will end health disparities.

Readers of Well will find it to be light on scientific jargon and academic references, making it nonthreatening to a general audience. The downside is that it will likely have limited appeal to the more academic reader who might look up a reference only to find that it is a blog post or thought piece rather than an empirical study. This raises the concern that the educated skeptic may think that the book has insufficient evidence to support the bigger ideas that are presented. However, this seems to be a calculated gamble designed to make the book approachable to readers who are more interested in gaining new perspective than exploring new scientific ground.

In the end, that's probably a good thing, because preaching to the choir will not change public opinion in a meaningful way that will enable us as a society to focus on the upstream causes ofdisease, stop blaming the victims of the world we have created, and look for new solutions beyond traditional health care. Well is a thorough introduction to a new perspective that could shape the thinking of many who give it a chance.

Sidebar

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The Public Health of Pleasure: Going Beyond Disease Prevention

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ABSTRACT (ENGLISH)

A thin but critical slice of thinking has emerged and persisted in the field of sexual health and relationships: that healthy relationships and sexuality are about not merely the absence of sexually transmitted diseases and intimate partner violence but also the presence of pleasurable and satisfying occurrences in the closest relationship that humans have with one another. As noted by Gruskin and Kismodi (p. 159), the World Association for Sexual Health Congress Declaration on Sexual Pleasure explicitly calls for "an intersectional, interdisciplinary and multi-sectorial approach to research, programs, service delivery, and advocacy that fully takes into account the links between sexual health and sexual rights and pleasure." The intersectional aspect reminds us that to achieve this not only

must programming and research take a wider approach on this subject, but laws, policy, and practices must be examined and addressed as well.

FULL TEXT

A thin but critical slice of thinking has emerged and persisted in the field of sexual health and relationships: that healthy relationships and sexuality are about not merely the absence of sexually transmitted diseases and intimate partner violence but also the presence of pleasurable and satisfying occurrences in the closest relationship that humans have with one another. As noted by Gruskin and Kismodi (p. 159), the World Association for Sexual Health Congress Declaration on Sexual Pleasure explicitly calls for "an intersectional, interdisciplinary and multi-sectorial approach to research, programs, service delivery, and advocacy that fully takes into account the links between sexual health and sexual rights and pleasure." The intersectional aspect reminds us that to achieve this not only must programming and research take a wider approach on this subject, but laws, policy, and practices must be examined and addressed as well.

DISEASE PREVENTION VERSUS HEALTHY SEXUALITY

Kantor and Lindberg (p. 145) explore how US-based national surveillance surveys do not ask questions that reflect skills related to sexual activity, such as refusal and what consent means, or questions that might relate to the pleasurable aspects of sexuality or relationships. They focus almost exclusively on whether HIV and other sexually transmitted infections or pregnancy prevention education is provided, even when venturing to ask about this topic for lesbian, gay, bisexual, transgender or questioning students. Because questions are often ambiguous, a student or school may report receiving education about birth control (although even this is less frequently addressed than sexually transmitted infection and pregnancy prevention) but not differentiate between programs that provide information about reproductive methods and those that promote abstinence only.

When we talk about the history ofpublic health, the first paradigm is often tied to the concept of sanitation. From John Snow to the formation of the US Environmental Protection Agency, a seminal focus on clean water, air, and land permeated our field. The basis for this foundation was disease prevention-from cholera and typhoid to asthma and emphysema. Yet there was undeniably pleasure to be had in breathing clean air, drinking purified water, and seeing skies unblackened by smog.

EXPANDED PURVIEW OF PUBLIC HEALTH

Public health has undergone a broad expansion in its reach. Today we include many topics that were not historically seen as within its realm, including immunization, prevention of health care-acquired infections, reduction or elimination of sexually transmitted diseases, adolescent pregnancy prevention, and prevention and control of chronic disease, including mental health and substance use disorders.

Yet the field of sexual and relationship health continues to move toward an emphasis on acknowledging and measuring progress on achieving pleasurable sexuality and healthy relationships. As stated by Pitts and Greene (p. 149), the World Health Organization defines sexual health as a "state of physical, emotional, mental, and social well-being in relation to sexuality."1

This positive definition, focused on the "well-being" ofthe individual "in relationship to sexuality" does not describe healthy sexuality as merely the absence of disease. Yet we also know that even access to sexual resources that may prevent disease are not equally distributed in the United States or around the world. Boone and Bowleg (p. 157) point out that when the sexuality of Black gay and bisexual men who have sex men is discussed, the focus is rarely, ifever, on pathways to pleasure but instead on topics such as criminalization of sexual behavior by HIV-infected individuals or lack of access to biological HIV prevention methods, such as preexposure prophylaxis.

But, then, given the role of pleasure in healthy sexuality, what stance should public health take on the issue of pornography? Does pornography itself cause harm sufficient to make it an issue to be addressed by public health? Nelson and Rothman (p. 151) argue that pornography is not a public health crisis although 17 states have introduced resolutions to that effect in their state legislature. The authors argue that it is not a public health crisis and that naming it one carries its own particular risks of misused resources or abuse of property or personal rights. In a

public health vignette, Rothman et al. (p. 154) describe a framework for addressing concerns about pornography, presenting a curriculum that she and others developed to improve pornography literacy among adolescents. The curriculum is set within a framework that asserts that healthy pornography is possible and can impart positive messages about sexual health and portray the pleasure and variety of consensual sex.

FUNDING FOR HEALTHY RELATIONSHIPS

This year, the Commonwealth of Massachusetts passed its fiscal year 2020 budget, which includes an amendment saying:

For a domestic violence and sexual assault prevention program focused on teens in high-risk communities; provided, that the programming shall be aimed at promoting healthy relationships and addressing teen dating violence; provided further, that the department shall partner with domestic violence and sexual assault service providers, other community-based organizations or school-based organizations to develop evidence-based and outcomes-focused prevention strategies; . . . and provided further, that funds may be expended for a competitive grant program . . . $1,000,000.2

This further reinforces the idea that promoting healthy relationships and healthy, consensual sex does indeed lie within the purview of public health.

"Wellness" has become part of the lexicon of public health, along with "healthy communities" and, of course, "the social determinants of health." Each of these addresses the environment portion of the "epidemiologic triad"-which includes place, race, and income inequality- which we now consider responsible for a majority of the health problems affecting any given population.3 Access to healthy relationships and sexuality is yet another aspect of how environment affects the health of individuals and populations.

As the field of public health expands its reach into problems as diverse as gun violence, intimate partner and community-based violence, and human rights, why shouldn't it also be on the leading edge of efforts to support healthy sexuality and healthy relationships? Although many groups have professional concerns about addressing topics such as sexual pleasure, public health has proven repeatedly that it is particularly adept at discussing and developing strategies to address sensitive but necessary topics. Â1PU

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CONTRIBUTORS

The authors contributed equally to this editorial.

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The authors have no conflicts of interest to report.

Sidebar

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Indicators to Guide and Monitor Climate Change Adaptation in the US Pacific Northwest

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ABSTRACT (ENGLISH)

Objectives. To develop a set of indicators to guide and monitor climate change adaptation in US state and local health departments. Methods. We performed a narrative review of literature on indicators of climate change adaptation and public health service capacity, mapped the findings onto activities grouped by the Centers for Disease Control and Prevention's Ten Essential Services, and drafted potential indicators to discuss with practitioners. We then refined the indicators after key informant interviews with 17 health department officials in the US Pacific Northwest in fall 2018. Results. Informants identified a need for clarity regarding state and local public health's role in climate change adaptation, integration of adaptation into existing programs, and strengthening of communication, partnerships, and response capacity to increase resilience. We propose a set of climate change indicators applicable for state and local health departments. Conclusions. With additional context-specific refinement, the proposed indicators can aid agencies in tracking adaptation efforts. The generalizability, robustness, and relevance of the proposed indicators should be explored in other settings with a broader set of stakeholders. (Am J Public Health. 2020;110:180-188. doi:10.2105/ AJPH.2019.305403)

FULL TEXT

Headnote

Objectives. To develop a set of indicators to guide and monitor climate change adaptation in US state and local health departments.

Methods. We performed a narrative review of literature on indicators of climate change adaptation and public health service capacity,mapped the findings onto activities grouped by the Centers for Disease Control and Prevention's Ten Essential Services, and drafted potential indicators to discuss with practitioners. We then refined the indicators after key informant interviews with 17 health department officials in the US Pacific Northwest in fall 2018.
Results. Informants identified a need for clarity regarding state and local public health's role in climate change adaptation, integration of adaptation into existing programs, and strengthening of communication, partnerships, and response capacity to increase resilience. We propose a set of climate change indicators applicable for state and local health departments.

Climate change presents significant challenges for state and local public health agencies.1'2 These challenges are diverse and vary widely by location as a result of population health status, hazard exposure, response capacity' differences in the rates at and degrees to which climate-sensitive hazards are changing, and decisions about adaptation in health and other sectors.3

In the United States, public health adaptation activities are under way at the national level'4 but relatively limited human and financial resources have been devoted to local adaptation and response, where the majority of adaptation occurs.2 Although many state and local health departments recognize the threat of climate change, few have the capacity to develop de novo an understanding of public health's role in climate change adaptation or effective adaptation programming.5 As climate change-related impacts and associated health risks become more pressing, efficiently and effectively developing adaptive capacity,6 including engagement by state and local public health decision-makers and practitioners,7 will become increasingly urgent.6

There is substantial literature on tracking the health impacts of climate change and developing adaptation plans.8-14 However, limited guidance is available on indicators that promote and track adaptation activities at the state and local health department levels.8'14 Aimed at national level efforts, the World Health Organization's framework for public health adaptation presents general conceptual indicators for national level efforts, but it is intended to be specific to climate change, rather than for mainstreamed activities integrated into existing efforts.15 The Centers for Disease Control and Prevention's (CDC's) Building Resilience Against Climate Effects (BRACE) framework16 describes 5 steps to guide climate change readiness in public health agencies. Step 4, developing and implementing an adaptation plan, highlights the importance of evidence-based adaptation planning, and step 5, evaluation of impacts, provides guidance for evaluation, but neither step gives substantial guidance on monitoring and tracking adaptation activities or on the development of process indicators. The Council of State and Territorial Epidemiologists' adaptation and policy indicators11 begin to lay the groundwork for the development of additional process indicators catered to state and local health departments, but more process indicators regarding adaptation are needed. Furthermore, an effort by Ebi et al. describes the need for process indicators related to climate change adaptation and health system resilience and lays further groundwork for their development.14

Attention to established frameworks can facilitate implementation of novel guidance.17 Public health activities in the United States are guided by a few common frameworks, the most familiar of which is the Ten Essential Services (TES) of Public Health, developed by the Core Public Health Functions Steering Committee in 1994.18 The TES builds on the 3 functions of public health (assessment, policy development, and assurance) proposed in the Institute of Medicine's 1988 Future of Public Health Report.7 The TES provides state, tribal, territorial, and local public health agencies in the United States with guidelines that outline their basic responsibilities.19 The TES is a simple and familiar tool used by many state and local health agencies and has been applied in other contexts.20'21 Therefore, we chose the TES framework as a starting point for organizing indicators of climate change adaptation activity.

Our primary objective was to develop indicators, situated in a familiar framework, for assessing and tracking state and local health agency capacity for effective climate change adaptation.

METHODS

Our methods comprised 4 parts: a narrative literature review,22 development of draft activities and indicators situated within the TES to characterize and track adaptation, key informant interviews regarding the utility and appropriateness of the proposed indicators and the challenges and opportunities for their use, and refinement of the

activities and indicators based on interviews.

We conducted a narrative literature review to determine whether indicators existed for use by state and local health departments to track uptake, implementation, and effectiveness of climate change adaptation activities. We were also interested in identifying literature applicable to the development of process indicators for tracking adaptation in this setting. The keywords we used to identify background literature were adaptive capacity AND climate change AND (institutions OR health sector OR public health). We searched articles on Scopus and Web of Science and then reviewed them for relevant indicators. We also searched government reports for climate change and health adaptation indicators.

We used our findings from this literature search to develop a draft set of indicators. We assessed the potentially applicable indicators identified in the narrative literature review for relevance and, where appropriate, modified them for a state orlocal health department and to fit into the TES framework. We also used themes identified in the narrative review, including constraints and barriers to adaptation,23 adaptive capacity,24 and adaptation engagement25 and readiness26,27 to develop additional adaptation and policy indicators.8,9'11,14 During this process, we consulted theoretical work describing health indicator development28-30 to ensure that our indicators were measurable and actionable. This resulted in 1 or more draft indicators related to adaptation activities for each TES category. Although we did not prespecify a time horizon for adaptation activities, our goal was to develop indicators relevant for planning in the near-term-over the next 1 to 2 decades- consistent with planning and budget horizons for other activities.

To test the utility, relevance, and comprehensiveness ofthe activities and indicators, we conducted 11 key informant interviews comprising a purposive sample of 17 tribal, state, and local public health officials working on climate and health in Washington State and Oregon, 2 climatically similar states. State climate and health program administrators in each state helped identify potential informants, who engaged in climate and health across the TES areas. We invited potential informants to participate by e-mail; we recruited additional informants through snowball sampling. We conducted 5 interviews with 11 Washington and local health department staff, 4 interviews with Oregon Health Authority and local health departments, and 2 interviews with staff from tribal communities located within the geographic boundaries of Washington and Oregon. We invited 40 individuals to participate, of whom 17 participated.

We conducted semistructured interviews lasting 45 to 60 minutes in person or remotely in August and September 2018, and 1 or more members of the research team detailed notes. An interview guide that we developed a priori included open-ended questions (Table A, available as a supplement to the online version of this article at http://www.ajph.org) to elicit informants' feedback on the draft indicators (Table B, available as a supplement to the online version of this article at http:// www.ajph.org), as well as on opportunities and challenges to implementation of the indicators. Informants identified the TES area or areas most closely aligned with their professional responsibilities and provided feedback in those areas. We reviewed notes to inductively identify key themes that emerged across the interviews. We then developed codes based on these themes, along with definitions, and institutionalized them into a codebook. Two coders then used NVivo qualitative data analysis software version 10 (QSR International Pty Ltd., Doncaster, Australia) to collaboratively code31 the interview notes.

The research team periodically reviewed and discussed the informants' feedback. We stopped recruitment when saturation was obtained for indicators across all of the TES. We used results and feedback from the key informant interviews to further refine the indicators.

RESULTS

We conducted the literature search in winter 2018 and limited it to publications in English. We identified about 90 publications as relevant to our goals and reviewed their abstracts. Upon review, we found no publications outlining indicators that matched our objective, although several were highly relevant practically and thematically. Of the practically relevant publications, several proposed general categories of indicator or, alternatively, specific indicators that were more relevant to a national scale.

Draft Activity and Indicator Framework

We developed a draft set of indicators (Table B) for discussion and feedback during key informant interviews. We selected indicators to be illustrative and to allow modification and specification in response to key informant input.28 30

Key Informant Interviews

Of the 17 key informants, 12 were state health officials, 2 were local health officials, 2 were tribal representatives, and 1 was a consultant. Several of the 11 interviews included more than 1 informant, yielding a total of 17 participants.

Informants noted that, although the draft activities (Table B) adequately captured existing and future climate change adaptation work in health agencies, they suggested several changes to make indicators more specific and actionable. Several informants noted that, although certain indicators would be appropriate for local health departments, tracking the full set is likely beyond their capacity and would need to be deferred to a larger organization with more resources.

Most informants noted that, for Oregon and Washington, it would be most appropriate for the indicators to be tracked at the state level.

In addition to comments on the draft activities and indicators, informants highlighted opportunities and challenges (Table C, available as a supplement to the online version of this article at http://www.ajph. org) regarding adaptation and engagement with climate change at different administrative levels. We organized these by major theme.

Collaboration and partnerships. A recurring theme across the interviews was the need for more collaboration and partnerships. Several benefits were advanced: to share expertise and activities, to extend activities into local communities more effectively, and to more effectively embed or mainstream climate change adaptation into existing work streams and programs. Informants from local health departments and tribal communities identified the lack of capacity in their organizations to work on adaptation, pointing to partnerships with state health, decision-makers, local organizations, and other nontraditional partners as a way to make progress at the local level. These informants also highlighted the need for guidance on how to seek partnerships and on the role of different administrative levels within public health.

Communication. Nearly all informants identified a need for more communication within, between, and across sectors with respect to adaptation and climate-related hazards. A couple ofstate-level informants noted that there is inadequate funding for communication, particularly at the local level. Furthermore, several informants noted the need for guidance on outreach and community engagement and in creating culturally and linguistically appropriate and politically sensitive messaging. A handful of informants noted that political feasibility ofmeasuring or operationalizing particular indicators and the most appropriate language to use depends on the audience and local community, and they highlighted the challenges of matching language to community priorities and perceptions. Respondents reported that a communications approach focused on weather-related hazards instead of climate change was often more successful. All informants highlighted the importance of communicating and engaging with local communities, but they noted the many challenges in doing so successfully.

Equity. Several informants highlighted the challenges they had in cross-cultural collaboration and communication. A couple of informants noted that tribal communities, in particular, lack the capacity to engage in adaptation on their own and must rely on external partnerships. However, this coordination is often difficult because ofissues of tribal sovereignty and other cross-cultural differences.

Resources, capacity, and authority. One of the most prominent themes throughout the interviews, mentioned by all informants, was the overwhelming lack of resources and capacity, particularly in rural and tribal communities. Informants identified this as a major barrier in adaptation implementation, and they suggested ways the proposed activities and indicators could be integrated into existing programs and plans, given capacity constraints. Furthermore, several informants noted they could benefit from guidance on partnerships, nontraditional funding opportunities, engaging with the community, and general guidance on how to become a climate-prepared health agency. Finally, a few informants noted their state health department's lack of regulatory authority as a major barrier to enforcing adaptationoriented plans and policies.

Using emergency preparedness and response capacity. Several informants highlighted the opportunity to build on existing response capacity in emergency preparedness divisions and departments, while also discussing the general lack of response capacity in public health agencies. Many informants mentioned the need for more holistic approaches, rather than relying only on siloed, hazard-specific, or event-based responses. Informants noted that both event-based and all-hazards preparedness approaches across agencies are needed both to respond to events as needed and for longer-term planning and capacity building.

Training. A final theme was the need for more training of the public health workforce on public health's role in climate change preparedness and response. Approximately one third of informants noted a need for guidance on the role ofpublic health and how the workforce should be trained to collaborate across sectors and approach climate change response holistically, rather than via event- and hazard-based responses.

Finai Framework

Table 1 lists several activities and indicator examples organized by essential service from the TES framework. It broadly describes representative programming in each service category and is generally applicable across regions. It provides examples of quantifiable indicators related to activities that can be used to track readiness, engagement, and ongoing progress in the relevant activity and is more specific to the hazards and challenges in the Pacific Northwest. The framework is meant to be a guide that can serve as a point of entry for agencies to use in developing their adaptation plans, modifying as necessary to reflect local vulnerabilities, dynamics, and activities. Table D (available as a supplement to the online version of this article at http:// www.ajph.org) provides more guidance on suggested effective use of the framework.

DISCUSSION

The literature on climate change adaptation in the health sector continues to evolve. There is a need for guidance at the state and local levels,8,9 where most climate change adaptation takes place. We aimed to develop a preliminary set of indicators, based on best practices for indicator development,28 30 for state and local adaptation in the United States, based on guidance for national actors,15 using existing climate change indicators,8-14 and situated within the context of the TES framework. Our research demonstrated that nationallevel guidance has relevance for local agencies,15,23,24 but needs to allow variable organizational structures, a wide range of different climate-sensitive hazards, resource limitations, and different approaches to engaging climate-sensitive health concerns, including the need to use ongoing activities, mainstream into existing activities and programs, and expand link within health programs and between health and other sectors.

To properly capture the trajectory of emerging adaptation activities and monitoring and evaluation efforts, suggested activities and indicators need to recognize the importance of existing programming and data streams for capturing adaptation activities and tracking adaptation engagement, which has been built around existing, hazard-specific programming and funding streams. Even in settings with high awareness of climate change health impacts and the need for adaptation, practitioners perceive a large gap between needs, as we discussed in the findings from key informant interviews, and available resources. They perceive that this gap hinders a comprehensive approach to health adaptation, connection with stakeholders, and coordination with other sectors.

Several informants noted that the lack of clarity regarding the role of public health in climate change has led to inadequate resource and capacity allocation. Washington and Oregon rank 22nd and 30th, respectively, in the United States for per capita public health spending,32 indicating that resource concerns may be applicable to many US state public health agencies. Given resource and capacity constraints, informants emphasized a need to integrate climate adaptation into existing work streams. By using the TES framework, we propose ways that activities and resources can be used to help agencies build and track additional capacity for climate-specific hazards. Yet, given the climate-related health impacts that communities are likely to face in the coming years,1,2 additional resources will ultimately be necessary to meet the demands placed on public health. Early implementation of effective adaptation would reduce the magnitude of future risks. Therefore, tribal, state, and local health agencies can use these activities and indicators to capture and communicate the important roles they play in climate response and to work with decision-makers in their communities and at the federal level to garner the necessary support for

their work.

Another notable theme was the need for more and stronger partnerships and collaborations between state and local health, county and city government, community groups and nonprofits, and other agencies to take a holistic, cross-sector approach to use capacity in other sectors, as well as hone existing relationships. Our informants emphasized that this reflects the larger role of stakeholder engagement in local public health activities, an important dynamic that should be tracked. Public health practitioners require tools and resources to facilitate their ability to advocate the integration ofpublic health considerations into adaptation decisions made by actors not in the health sector, such as utilities, natural resources, urban planning, and transit. For example, templates and guidance on conducting health impact assessments of common adaptation strategies and customized communication tools may facilitate their ability to coordinate with other sectors, resulting in a more substantive impact on community-level adaptation strategies.

Informants also called for additional training to support the ability of the public health workforce to meaningfully engage in climate adaptation activities. To support this goal, continuing education curriculum and professional development opportunities should be developed and offered to members of the public health workforce, such as through the CDC's BRACE framework program, which supports ongoing training and education opportunities to grantees.33 However, the CDC's BRACE framework program is small; supports a minority of states, tribes, and territories; and represents a small fraction of the workforce of interest. In addition, guidance and tools for staff on communication within and across sectors, partnership development, and linguistically and culturally appropriate communication about climate change should be considered. Schools of public health may consider the development and integration into existing curriculum of coursework and experiential learning on climate change adaptation and the roles of public health agencies.

Limitations

These activities and indicators have limitations that can be improved with additional feedback and application in other settings. First, although the breadth of this pilot framework allows flexibility, we obtained feedback only from public health officials in 2 states in 1 region, so feedback may not include all stakeholders or generalize to other settings. In particular, the indicators reflect the specific challenges and hazards experienced in these 2 states, which are not generalizable to all settings in the United States, potentially limiting the application of these specific indicators to other settings. However, the activities are more broadly relevant across regions.

Second, not all activities listed under each service are applicable to each agency or tribe but, rather, represent the full suite of potential activities. The indicators are most relevant to the functions of state agencies, as organized in Washington and Oregon, which may or may not be the case in other settings, depending on the size and jurisdiction ofeach state and local health agency. Furthermore, because the activities and indicators do not enumerate every possible climate- or weather-related hazard, agencies and tribes will need to identify hazards specific to their region or climate zone that need to be addressed to ensure readiness. To better characterize the limitations of these activities and indicators in other settings, additional research needs to test the utility of the activities and indicators in other geographic areas and agencies, and a broader audience of stakeholders should be engaged.

Lastly, the indicators as developed do not focus significantly on tracking resources and investments relevant to adaptation. This likely relates to the emphasis on mainstreaming and the difficulty of disaggregating funding streams focused on particular hazards. Funding to support environmental public health activity may be a reasonable proxy, but additional research is needed before this can be proposed as a valid indicator.

Another limitation is the reliance of the activities and indicators on the TES. We chose the TES because of its comprehensiveness and wide acceptance in the United States, but it does not address specific capabilities such as emergency preparedness; therefore, many state and local health departments have turned to other frameworks, such as the Foundational Public Health Services34 framework, to organize their work. Although this framework is built around the TES, opportunities to crosswalk this framework with the framework or other frameworks may prove more useful for some agencies and has the potential to increase the utility and applicability of this framework to other settings.

Public Health Implications

This work begins to address a critical need for indicators to describe and track state and local health agency adaptation activities in the United States. Through a narrative literature review and key informant interviews with state, tribal, and local health officials in Washington and Oregon, activities and indicators were proposed and refined to guide state and local health agencies and tribes in tracking and building capacity in preparing and adapting to climate- and weather-related events. The activities and indicators are not meant to be comprehensive for all hazards and scenarios; instead, they are a guide to aid agencies, departments, and tribes in considering what steps they need to take and what areas they need to invest to become more climate-prepared organizations. This is a pilot framework that proposes broadly applicable activities and regionally specific indicators that need refinement in other communities. Â1PU

CONTRIBUTORS

A. Doubleday wrote the original draft of the article. A. Doubleday and N. A. Errett performed the formal analysis. A. Doubleday, N.A. Errett, andJ.J. Hess were responsible for investigation, methodology, and validation. N. A. Errett andJ.J. Hess supervised the study. K. L. Ebi and J. J. Hess conceptualized the study and acquired the funding.J.J. Hess was the project administrator. All ofthe authors reviewed and edited the article.

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The authors have no conflicts of interest to declare.

HUMAN PARTICIPANT PROTECTION

The University of Washington's Human Subjects Division determined this research to be human participants research that qualified for exempt status.

Sidebar

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Anonymous

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Contraception Type and Female Sexual Dysfunction

Mugore, Matinatsa; Kalia, Vrinda; Lewandowski, Stephen A; Gaspard, Naomi

FULL TEXT

A cross-sectional study in Nairobi, Kenya, found that women who use hormonal contraception have a higher prevalence of female sexual dysfunction than do women who use nonhormonal contraception. Female sexual dysfunction includes decreased arousal, discomfort during intercourse, and difficulty achieving orgasm. Butt et al. administered the Female Sexual Function Index survey to 566 women aged 18 to 36 years. The Female Sexual Function Index included questions about arousal, comfort during intercourse, and satisfaction with one's sexual life.

The prevalence of female sexual dysfunction among women who used hormonal contraception was 51.5%, whereas the prevalence among women who used nonhormonal contraception was 29.6%. There is an association between the use of hormonal contraceptives and decreased female sexual satisfaction and functioning.
Citation. Butt MR, Lema V, Mukaindo A, Mohamoud G, Shabani J. Prevalence of and factors associated with female sexual dysfunction among women using hormonal and non-hormonal contraception at the AGA Khan University Hospital Nairobi. Afr J Prm Health Care Fam Med. 2019;11(1):a1 955.

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Promoting Positive Sexual Health

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ABSTRACT (ENGLISH)

See also Landers and Kapadia, p. 140, and the AJPH Public Health of Pleasure section, pp. 145-160. "Doc, I'm having the best sex of my life. I'm 67 and I just tried anal sex and I love it!" This was not the response I expected while inquiring about my primary care patient'snew boyfriend, especially not during my first morning encounter, but it was a welcome surprise. My patient followed with a question: "Can you go back and forth, like from hole to hole?" referring to both anal and vaginal penetration during the same sexual encounter. At the tender age of 67, my patient was in the prime of her life, exploring and enjoying her sexuality, and had questions for me about sexual health. Sexual health has been defined by the World Health Organization as a "state ofphysical, emotional, mental, and social well-being in relation to sexuality." Sexuality, in turn, is defined by the American College of Obstetricians and Gynecologists as "a broad range of expressions of intimacy and is fundamental to selfidentification, with strong cultural, biologic, and psychologic components." Bottom line, sex matters and is an essential element to our patients' overall health and, therefore, conversations about sex cannot be ignored or undervalued. Unfortunately, the majority of our patients believe their doctors will dismiss concerns about sex.

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SEX MATTERS

As health care providers, we are charged with discussing our
patients' social histories, which include pressing issues such as smoking, alcohol, and drug use. Let's be honest, time is precious. Fifteen-minute visits do not give providers enough time to have detailed conversations with patients about sex amid the myriad bureaucratic and businessminded pressures. When we do ultimately ask our patients about sex, rather than focusing on it as a way to connect and find intimacy, pleasure, or joy, we instead focus on sex as a mechanism for disease acquisition. This perspective has been shaped and sustained by the discovery of sexually transmitted infections, such as gonorrhea and syphilis, and the HIV/ AIDS epidemic, which together cast sex and sexuality as shameful and, hence, vilified. In response, health care providers simplified conversations about sexual health to one message: "Use a condom. Every time. Or you'll suffer."

We need to change this narrative. The National Coalition of Sexual Health has outlined key points to ensure productive conversations with patients about sex.4 Important elements include avoiding assumptions based on patient age, appearance, or marital status. Yes, older adults have sex, as my patient proudly demonstrates, and many adults enjoy sex throughout their life, irrespective of gender. Also, unless told explicitly, medical providers should not assume a patient's gender identity, sexual orientation, or sexual practices. Just because a person appears masculine does not automatically designate him or he as their pronouns nor their partners as straight or cisgender. To facilitate conversation, the guide outlines questions that should be asked at least once or annually to all patients. For example, "What is your gender identity?" and "What questions do you have about your body, sex, or both?"4 The American College of Obstetricians and Gynecologists also suggests questions that may be asked after general information is gathered, such as, "Are you satisfied with the frequency of sexual activity," "Do you have orgasms," and "Does your vagina lubricate enough?"2 We can then follow up or clarify unfamiliar vocabulary used by patients. This conduct allows us to promote comprehensive and affirming sexual health care that is ultimately "sex positive" regardless of our patient's gender or sexuality.

BE SEX POSITIVE

What does it mean to be "sex positive," and how can we as health care providers better engage with our patients about sex? First, being sex positive includes accepting a great diversity of sexual activities. It is founded in the philosophy that consensual expressions of sexuality are healthy and strips away the belief that some types of sex are more acceptable than others.5 Second, being sex positive affirms an individuals' right to enjoy the kind of sex they are having without feeling judged. And lastly, it demands comprehensive education, particularly on sexual practices, pregnancy and family building, and sexually transmitted infections (STIs). There are many resources available to providers that can help us become sex positive, including scripts, toolkits, and guidelines.

SEXUALLY TRAMSITTED INFECTIONS

We cannot discuss sexual health without acknowledging the overwhelmingpublic health impact of STIs, "the hidden epidemic." In 2017, the Centers for Disease Control and Prevention reported increases in infections with Chlamydia trachomatis, Neisseria gonorrheae, and primary and secondary syphilis. It is important to remember that a significant proportion of those who contract STIs will not have symptoms, and thus if not screened appropriately will remain undiagnosed and continue transmitting infections. Furthermore, patients undiagnosed or untreated for STIs may develop long-term sequelae, with the potential for significant morbidity (e.g., pelvic inflammatory disease, infertility, and disseminated gonorrhea). Therefore, patients need to be educated about risk-reducing practices regularly and screened routinely according to the Centers for Disease Control and Prevention guidelines.

As providers, we also cannot forget about stigma directed toward individuals diagnosed with STIs, as it poses a substantial threat to the care we aim to deliver. Shame of acquiring an STI keeps patients from getting tested or being honest with their medical providers about their sexual behaviors. With the advent of effective HIV-prevention strategies such as pre-exposure prophylaxis and treatment as prevention, people are more comfortable having sex without condoms and thus are at greater risk for STI acquisition.6

OPPORTUNITY IN THE SEXUAL HISTORY

Rather than approaching the sexual history as an opportunity to give all or nothing advice about condoms or

abstinence, we can use it to encourage healthy expressions of sexuality and provide culturally affirming advice. It also offers an opportunity to improve the sexual health information we deliver to our patients and enhance services, services that are more convenient, welcoming, and readily accessible to patients. For example, (1) expanding sexual health access, like the eight New York City Department of Health Sexual Health Clinics, located in four of the five boroughs, offering low- or no-cost services for STI testing; (2) calling for the development of screening protocols that incorporate effective point-ofcare and at-home testing options that may limit clinic visits7; and (3) establishing patient-centered and nonstigmatizing STI testing and treatment that is fast and efficient and automates the notification process, as in the London's Dean Street Express testing model. Such innovative initiatives may be applied to areas most afflicted by HIV and other STIs, taking into account racial, ethnic, and religious diversity.

We have powerful biomedical tools to end the HIV epidemic and reduce the spread of STIs. One essential tool is becoming providers who embody the philosophy ofbeing sex positive and gender and sexuality affirming. Changing the conversation on sexual health moves us from stigma to action and exemplifies our commitment to realistic patient safety and experience, built on trust and openness. Hearing my 67-year-old patient talk about sex reminded me of its importance to overall health, as well as the diversity of sexual practices being explored by patients irrespective of gender and age.

"You're the only doctor I've ever talked to like this. To be honest, I don't usually talk about this stuff." I believe validating my patient's questions about sex allowed me to engage with her on activities that bring her joy and connection, and strengthened an already enduring therapeutic relationship. If medical providers are comfortable talking about sex, patients will be too, and an opportunity to engage and connect with patients is gained. >4jPI-l

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CONTRIBUTORS

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CONFLICTS OF INTEREST

Robert A. Pitts receives speaking fees for Gilead Sciences, Inc. Richard E. Greene has no conflicts of interest to disclose.

Sidebar

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DETAILS

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Horticultural Therapy in Singapore

Mugore, Matinatsa; Kalia, Vrinda; Lewandowski, Stephen A; Gaspard, Naomi

FULL TEXT

Horticultural therapy (HT), engagement with gardening and plant-based activities, shows potential to promote positive emotions and enhance mental well-being. Ng et al. conducted a randomized controlled trial with 59 adults aged 61 to 77 years in Singapore to assess biological and psychological benefits of HT. The intervention group received 15 HT sessions over a 6-month period. Researchers observed reduced plasma IL-6, indicating attenuated inflammation; protective maintenance of 3 biomarkers that may preserve cognitive function and protect against neurodegeneration; and improvements in social connectedness in the HT group. These findings highlight potential benefits of HT therapy for healthy older adults and inform potential mechanisms of action.
Citation. Ng KST, Sia A, Ng MKW, et al. Effects of horticultural therapy on Asian older adults: a randomized controlled trial. Int J Environ Res Public Health. 2018;15(8):E1705.

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Engaging Community Members to Eradicate Health Disparities

Morain, Stephanie R, PhD, MPH [1] [1] Center for Medical Ethics and Health Policy, Baylor College of Medicine, Houston, TX

ABSTRACT (ENGLISH)

The article by Subica and Brown makes a welcome contribution to the literature by offering critical insights on how to operationalize this commitment to addressing health equity and highlighting the importance of community knowledge when designing health policies that can reduce, rather than exacerbate, health disparities. Specifically, the authors introduce a methodology for engaging lay individuals from disadvantaged communities in tailoring both the conduct of public health research and the implementation of resulting interventions to better reduce health disparities. Their approach-citizens' panels for health equity-rests on the premise that community-level health can be enhanced through community-specific knowledge and interests.

FULL TEXT

Health disparities, understood as differences in health outcomes between groups that reflect social inequities, have been a longstanding feature of the US landscape. Racial health disparities have been particularly persistent and pernicious, with the health of African Americans lagging behind that of Whites according to nearly every metric. In 1950, shortly after the passage of the Social Security Act, the life expectancy of White Americans was just above 69 years; among Blacks, it was less than 61 years. It took four decades-until 1990- for the life expectancy of Blacks to finally reach 69 years.1

Although this gap in life expectancy has narrowed, it still persists. Similar gaps are evident across the life span, with infants born to non-Hispanic Black mothers having a mortality rate more than two times that of' infants born to non-Hispanic White mothers. Furthermore, Black, American Indian, and Alaska Native women are two to three times as likely as White women to die from pregnancy-related causes.1 Health disparities are observed in other categories of disadvantage as well, including disparities by gender, sexual orientation, age, and income.

These disparities reflect patterns of systemic disadvantage that are profoundly unjust and affect not only health but every other dimension of well-being.2 A critical function of public health is to vigilantly measure such disparities as a means of motivating and informing efforts to eliminate them.2 Addressing these health disparities has long been a central focus of public health. As observed by Ruth Faden and Sirine Shebaya, "the commitment to improving the health of those who are socially disadvantaged is as constitutive of' public health as is the commitment to promote health more generally."2

The United States has made progress in reducing health disparities, but even wellintentioned efforts may widen these gaps. Population-level strategies, although critical for advancing public health, may not necessarily benefit all groups equally. For example, antismoking campaigns successfully reduced overall tobacco use yet inadvertently led to socioeconomic disparities in smoking rates, as declines in rates of tobacco use were substantially higher among those with more income and education than other groups.

Similarly, the 1998 implementation of federal legislation mandating the addition of folic acid to enriched cereal grain products led to a significant decrease in the prevalence of neural tube defects; however, the benefits of this legislation did not extend as fully to many Hispanic women, who were less likely to consume enriched flourproducts given that corn is their staple grain. Although folic acid is now added to many corn masa flour-based products, offering similar preventive benefits for Hispanic infants, this supplementation effort lagged behind that of other flours by nearly two decades.3 The issues just described-smoking cessation and folic acid supplementation- highlight the importance of focusing on health equity in the design and implementation of public health policies.

The article by Subica and Brown (p. 166) makes a welcome contribution to the literature by offering critical insights on how to operationalize this commitment to addressing health equity and highlighting the importance of community

knowledge when designing health policies that can reduce, rather than exacerbate, health disparities. Specifically, the authors introduce a methodology for engaging lay individuals from disadvantaged communities in tailoring both the conduct of public health research and the implementation of resulting interventions to better reduce health disparities. Their approach-citizens' panels for health equity-rests on the premise that community-level health can be enhanced through community-specific knowledge and interests.

Drawing on insights from both deliberative democracy and community-based participatory research, their approach is consistent with a broader trend toward public engagement in research and policy within and beyond the health sphere. 4 The case for deliberative approaches to public engagement is arguably especially strong in the context of public health, which, with its focus on populations, often requires government action. An emphasis on deliberation reflects a commitment to a core conception of democracy, namely that people should be treated not merely as objects of policy but as autonomous agents who take part in the governance of their - „5 own society.

Subica and Brown present their approach as involving five core steps:

1. identify a community partner,
2. establish a community sample and recruitment plan,
3. identify decisions requiring community input,
4. prepare content for panel deliberation, and
5. facilitate citizens' panels.

They describe these steps as applicable for engagement, both in designing future studies to ensure that research is relevant for and supported by the target community and in tailoring intervention strategies to support their feasibility, acceptability, and effectiveness.

The authors present two case studies from federally funded projects to illustrate the use and advantages of citizens' panels. The advantages include identification ofhigh-value, communitypreferred research studies and elicitation of key insights from a difficult-to-reach population so that interventions can be tailored in a way that is responsive to the perspectives and practices of the target population. The authors' experiences support their arguments for the potential value in engaging community members to promote sustained programs that can improve the health of disadvantaged populations.

Although this approach holds promise, much work remains. Public health has long recognized the importance of measurement to document health disparities. Moving forward, this commitment to measurement must include not only measuring disparities themselves but also measuring the impact of engagement approaches aimed at eliminating disparities. However, recent efforts to measure engagement in related domains (e.g., patientengaged research) notwithstanding, considerable uncertainty remains in how to evaluate the benefits of lay engagement in research.6 Among other reasons, developing rigorous evaluation methods is critical in supporting the replication of successful approaches and the (often considerable) investment of resources required for engagement activities. Future work on citizens' panels and related engagement methods to address disparities should explore these challenges.

In addition, realizing the value of engagement approaches to advance health equity will likely require developing skills beyond those currently emphasized in many academic public health programs. Traditionally, courses on health disparities and social determinants of health have focused on describing problems and policy issues rather than on exploring methods for their remediation. Here again, the literature from patient-engaged research may be instructive. For example, recent literature has documented challenges related to the engagement of lay individuals ranging from uncertainty among researchers regarding how best to select individuals for engagement to institutional review board uncertainty associated with oversight of those individuals once selected.6,7 Further work is needed to develop guidance for these and other stakeholders regarding how to engage lay individuals in research.7

Eradicating health disparities remains a central goal for public health. The article by Subica and Brown presents a promising approach for advancing this effort by engaging community members and their collective expertise to identify targeted strategies to advance health equity. Future work should build on this foundation to identify how such successes can be replicated and to develop the capacity and skills to expand these approaches. ÂfPU

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CONFLICTS OF INTEREST

The authordeclares no conflicts ofinterest.

Sidebar

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DETAILS

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Improving the Use of Mortality Data in Public Health: A Comparison of Garbage Code Redistribution Models

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ABSTRACT (ENGLISH)

Objectives.To describe and compare 3 garbage code (GC) redistribution models: naive Bayes classifier (NB), coarsened exact matching (CEM), and multinomial logistic regression (MLR). Methods. We analyzed Taiwan Vital Registration data (2008-2016) using a 2-step approach. First, we used non-GC death records to evaluate 3 different prediction models (NB, CEM, and MLR), incorporating individual-level information on multiple causes of death (MCDs) and demographic characteristics. Second, we applied the best-performing model to GC death records to predict the underlying causes of death. We conducted additional simulation analyses for evaluating the predictive performance of models. Results. When we did not account for MCDs, all 3 models presented high average misclassification rates in GC assignment (NB, 81%;CEM, 86%;MLR, 81%). In the presence of MCD information, NB and MLR exhibited significant improvement in assignment accuracy (19% and 17% misclassification rate, respectively). Furthermore, CEM without a variable selection procedure resulted in a substantially higher misclassification rate (40%). Conclusions. Comparing potential GC redistribution approaches provides guidance for obtaining better estimates of cause-of-death distribution and highlights the significance of MCD information for vital registration system reform. (Am J Public Health. 2020;110: 222-229. doi:10.2105/AJPH.2019.305439)

FULL TEXT

Headnote

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Conclusions. Comparing potential GC redistribution approaches provides guidance for obtaining better estimates of cause-of-death distribution and highlights the significance of MCD information for vital registration system reform. (Am J Public Health. 2020;110: 222-229. doi:10.2105/AJPH.2019.305439)

(ProQuest: ... denotes formulae omitted.)

Information on causes of death at the national level provides critical inputs for the development of national health policies and evaluation of population health. However, problematic assignment of the underlying cause of death (UCD) frequently occurs because of the complicated assignment process of the cause-of-death classification system and inconsistent practice procedure in completing death certificates.1 According to the World Health Organization (WHO), the definition of UCD is as follows: "the disease or injury which initiated the chain of morbid events leading directly to death, or the circumstances of the accident or violence which produced the fatal injury. "2(p34) Because of uncertainty regarding the UCD or lack ofknowledge and practice of the correct procedures for completing a death certificate, the certifying physicians sometimes mistakenly assign intermediate cause of death (e.g., cardiac arrest, heart failure), ill-defined conditions or symptoms (e.g., dyspnea), or unspecified codes within larger groups of causes (e.g., ill-defined sites of cancer) as the UCD. These so-called garbage codes (GCs) provide useless information for public health analysis; therefore, they should not be designated as the UCD.3

Algorithm-based approaches have been used to reassign GCs to informative UCDs with the aim of improving the quality and utility of mortality statistics.4,5 These methods have frequently been applied to secondary mortality data (at the aggregated level), but they suffer from the drawback of not considering the heterogeneity of GCs across countries and health care systems. For the purpose of redistribution, alternative approaches, including multinomial

logistic regression6 (MLR) and coarsened exact matching7 (CEM), have used individual-level information embedded within mortality data. The shortcoming of MLR is that it requires assumptions about how variables are related to the outcome, whereas CEM assumes the underlying probability structure that enforces complete interdependencies of predictors. However, the empirical performance and scalability of the 2 data-driven approaches have not been well assessed.8

In addition to the MLR and CEM approaches, we explored a new nonparametric method-the naive Bayes classifier (NB), which has the advantage of fast implementation and low risk of overfitting. We evaluated and compared the classification performance and scalability of 3 data-driven approaches (NB, CEM, and MLR) using empirical data sets in Taiwan and simulated data sets under diverse scenarios.

METHODS

All deaths in Taiwan are required by law to be registered, and death registry data sets provide timely and complete information regarding the cause of death. Nonetheless, GCs accounted for more than 15% of registered deaths in 2016, higher than any other single cause of death.9 We obtained vital registration data at the individual level, including age, sex, residence, and marital status as well as date, manner, and place of death. We obtained data for multiple causes of death (MCDs) from the Multiple Causes of Death data set. These data have been collected by the Department of Statistics, Ministry of Health and Welfare since 2008, with cause of death coded according to the International Statistical Classification of Diseases and Related Health Problems (ICD)-10.10

Garbage Code and Underlying Cause of Death

We categorized the GCs for cause of death into 9 groups; septicemia, volume depletion, ill-defined cancer site, heart failure, ill-defined cardiovascular diseases, renal failure, ill-defined injury, ill-defined conditions, and other ill-defined codes (GC01-GC09; Table A, available as a supplement to the online version of this article at http://www.ajph.org).11 Because of the practical difficulty of assigning each GC to a specific UCD, we constructed a condensed classification system of mutually exclusive and collectively exhaustive groups of crucial cause of death (Table A), consistent with the guidelines of WHO and those reported in previous studies.12 14 Nonetheless, our model can be generalized to any grouping system. Users can choose an appropriate grouping system based on the required level of detail in mortality information and sample size considerations (limiting the model complexity without overfitting). We further matched the groups of mapping lists to corresponding GCs according to physiological mechanisms and domain knowledge (Table B, available as a supplement to the online version of this article at http://www.ajph.org).2,13

Redistribution Models

To probabilistically redistribute the GCs to target UCDs, we defined the analysis as solving a classification problem, given individual characteristics and MCDs. We implemented 2-step analyses for model construction and application. First, we used non-GC death records to construct 3 types of prediction model (NB, CEM, and MLR), incorporating individual-level information such as demographics and MCDs as the predictors. For each type ofprediction model, we carried out variable selection using fivefold cross-validation. We selected and retrained the best-performing models using the complete non-GC records. Second, we applied the bestperforming model constructed in the previous step to GC records, which were redistributed probabilistically to their potential UCDs. We conducted model construction and GC redistribution separately for each year.

Sex, age (5-year groups), marital status, urbanization level of residence,15 month of death, manner of death, and the level of health care facility that issued the death certificate constituted the full set of predictor variables. In addition to using each full model that included all available predictor variables, we applied a selection procedure to exclude redundant covariates (excess variables that did harm to the predictive ability). The 3 types of prediction model are briefly described in the following paragraphs, and detailed descriptions are provided in the supplemental material.

NB classifier, a generative approach that estimates the conditional probability oftarget UCDs using Bayes' theorem, is written as:

... (1)

where u is an r-length vector corresponding to r target UCD categories. Together, k predictors (x) and m contributing MCDs (v) are used to infer the probabilities ofpotential UCDs. Notably, m varies among individuals, so we consider MCDs as a set for each individual. NB further invokes conditional independence assumptions among predictors; therefore:

... (2)

We calculated the maximum likelihood estimates of the constituent probabilities on the right-hand side directly from the data. To assess the effect of interdependencies among predictor variables, we added tree- and forest-augmented naive Bayes classifiers (TANB and FANB), as well as joining operations in the variable selection procedure forNB, as the sensitivity analysis (sections 1-3 of the Appendix, available as a supplement to the online version of this article at http:// www.ajph.org).

CEM comprises the following procedures: (1) matching the individuals according to predictor variables and (2) proportionally redistributing the individual according to the target UCD distribution in the matched group. Although CEM is often depicted algorithmically, it can be formulated as a special case of the NB classifier that joins all predictor variables used (Appendix, section 4).

MLR is a discriminative approach that has parameterization of target probabilities that are distinct from NB and CEM. It is formulated as r - 1 independent binary logistic regression models:

... (3)

where a total ofr target UCD categories (u(1),... , u(r)) are present, and u(1) is set as the reference category. bjX is the linear predictor, including predictor variables and indicator variables of contributing MCDs (Appendix, section 5).

Variable Selection and Model Evaluation

We used backward sequential elimination (BSE) and backward sequential elimination joining (BSEJ) algorithms to search for the most parsimonious model and to improve predictive ability.16 The procedure comprised the following steps: (1) evaluating submodels generated by the elimination or joining operation, (2) testing the reduction in prediction error, and (3) proceeding to the next iteration, or reporting the current model (Appendix, section 6).

We evaluated each model on the basis of its out-of-sample average classification error, obtained from fivefold crossvalidation. We randomly partitioned non-GC death records into 5 groups; we selected one at a time as the validation set, and the rest formed the training set. Because we used 0/1 loss function as the error measure (err,), we interpreted the average classification error as the misclassification rate:

... (4)

where I(*) is an indicator function that returns 1 when the condition is true and 0 when it is false (Appendix, section 7). In addition, we performed a simulation analysis to evaluate the potential effects of missing data, sample size, and number of redundant covariates on the predictive performance of3 models (Appendix, section 8). In summary, we compared 6 models, which were 3 full models (NB, CEM, MLR) and 3 models with variable selection procedures (NB_BSEJ, CEM_BSE, and MLR_BSE).

Garbage Code Redistribution

The type of GC can also inform meaningful target UCD groups. For example, illdefined cancers should be redistributed exclusively to cancer-related UCD groups, and heart failure should be reassigned to noncommunicable diseases apart from cancers and mental and neurological conditions. This GC-UCD mapping list comes with the cause-of-death classification system and is based on physiological mechanisms and domain knowledge (Table B).2,13 We applied this mapping list in the final prediction step for all models to prevent the prediction of implausible UCD categories. For each GC record, we ignored the predicted probabilities of implausible UCD categories and renormalized the remaining distribution (Appendix, section 9). We conducted data management using SAS 9.3 (SAS Institute, Cary, NC) and performed all statistical analyses and predictions using R 3.6.1 (http:// www.r-project.org).

RESULTS

Table 1 presents the frequency of GCs by key covariates in Taiwan from 2008 to 2016. The proportion of GC deaths accounted for 13.1% of total deaths and was higher among women (14.7%) than men (12.7%). Of the 9 groups of GC deaths, ill-defined condition (33.5%), ill-defined cardiovascular disease (CVD; 25.8%), septicemia (17.4%), and

heart failure (16.6%) were the major groups, accounting for 93.6% of all GCs. The distribution ofGC pattern varied by covariates; for example, the GC deaths among people aged 15 to 65 years were more likely to be designated as ill-defined CVD than those in other age groups, and GC deaths that occurred in hospitals exhibited a higher proportion of septicemia than did other places of death.

The misclassification rate for each model is shown in Figure 1 (see Tables C and D, available as a supplement to the online version of this article at http://www.ajph.org, for model contents). Redistribution models without MCD information had misclassification rates ofapproximately 80%, and all methods performed similarly throughout the years (Figure 1, left panel). Variable selection made a distinction only between CEM and CEM_BSE, suggesting the vulnerability of CEM regarding redundant covariates. Frequently dropped redundant variables included urbanization level and month of death (Table C). By contrast, NB and MLR were less sensitive to redundant covariates as they tended to retain all variables after the selection procedure. Depending on the year, NB_BSEJ had selected joined variables, such as sex-age and place-manner of death, implying an interactive effect of these variables. However, the performance levels of NB, NB_BSEJ, TANB, and FANB were indistinguishable (Figure A, available as a supplement to the online version of this article at http://www.ajph.org).

Incorporating MCD information substantially reduced the misclassification rate and improved the relative performance of all assessed models (Figure 1, right panel). MLR (15%-17% misclassification) consistently exhibited higher performance than all other models over the years, whereas MLR_BSE showed nonsignificant additional improvement. The models with the next-highest performance were NB_BSEJ, CEM _BSE, and NB (18%-21% misclassification); the full CEM model had the worst performance, with almost 40% misclassification. Again, CEM was considerably more sensitive to the variable selection procedure than was NB, whereas MLR was almost unaffected. Notably, CEM_BSE and NB_BSE dropped many of the variables from the complete set (Table D), suggesting that MCD information dominates in the inference of potential UCDs. Accordingly, we selected the best performance model that we found in the first stage of the analyses (MLR_BSE with MCD information) to redistribute GC records. Because the variable selection procedure resulted in different variable sets in each year, and cross-year predictions increased the classification error (Table E, available as a supplement to the online version of this article at http://www.ajph.org), we retrained the model and predicted GC deaths separately by year.

Throughout the study period, the proportion of GCs in the general population remained comparable (Figure B, available as a supplement to the online version of this article at http://www.ajph.org). Approximately 28% of GC-registered deaths were redistributed to other cardiovascular causes, followed by other noncommunicable diseases (10.4%), chronic respiratory diseases (10.3%), and mental and neurological diseases (8.6%). Overall, we observed no significant changes in the relative frequency ofUCDs. However, when we considered specific subgroups, the impact of GC redistribution may have been enough to alter the ranking of the top causes of death. For example, the rankings of respiratory infections, other cancer, other noncommunicable diseases, other cardiovascular diseases, and mental or neurological conditions increased in the male population (Table 2). Other causes of death declined after GC reassignment, resulting in substantial reshuffling of the rankings. A higher number of attainable GCs resulted in an increased potential for change in the rankings or proportion of target UCDs. For instance, the proportion of other cardiovascular diseases was increased by the large number of heart failure and ill-defined cardiovascular disease registrations, which accounted for 45.7% of all the GCs. Conversely, the proportion and ranking of all cancers declined because of the infrequent occurrence of ill-defined cancer GCs (2.6%).

We performed simulation analyses for 9 different scenarios that varied with the quality of data (as percentage of missing values, PNa) and modeling procedure (as number of redundant covariates, r). In the optimistic scenario of no missing data (Figure 2), MLR had the best performance among all 3 methods regardless of redundant variables or sample size. The performance of MLR, nonetheless, was sensitive to the quality of data and number of redundant covariates included. In more challenging scenarios, the performance of MLR was tied with or even surpassed by both CEM and NB with the growing amount of missing information and redundant covariates. In the worst case, where there are more redundant covariates than effective ones, the misclassification rate for NB was significantly better than those for CEM and MLR (by ~6%). Furthermore, CEM and MLR were found sensitive to relative sample

size in challenging scenarios, whereas NB was able to perform comparably well even with a small data set.

DISCUSSION

The redistribution ofGCs to appropriate underlying causes had a significant effect on cause of death at the population level- particularly throughout the past decade, when the proportion of GCs in the Taiwan vital registry system remained high. In this study, we compared 2 redistribution models (CEM and MLR) with a newly proposed NB model. If MCDs were not considered, all 3 models performed poorly, but in the presence of MCD information, the MLR model outperformed the other models. Therefore, the MLR model, combined with variable selection and MCD information, is suggested for GC redistribution in Taiwan. We also found that the CEM model had a high risk of overfitting and high sensitivity to redundant covariates, contradictory to the general preferences ofnonparametric methods. Apart from the established mapping list for appropriate pairs of GCs and UCDs, these procedures were made verifiable, data driven,12-14 and adaptive to MCD information. Our results showed that most GC deaths were redistributed to other cardiovascular diseases (28%), other noncommunicable disease (10.4%), and chronic respiratory diseases (10.3%). Adjustment for GCs can alter the rankings of UCDs, particularly in some subgroups; therefore, it is necessary that the government urgently prioritize policies relevant to these diseases and that public awareness of these diseases be increased.

Correcting or adjusting the systematic bias in health data is critical for epidemiological studies or burden-of-disease estimates at the national and subnational levels. For example, compared with cancer, a systematically higher percentage of GCs for cardiovascular diseases were reassigned by the redistribution procedure, leading to a reshuffling of the most crucial causes of death in Taiwan. We reassigned each GC death to 1 ofseveral fractions of UCDs, which may compensate for the shortage of current cause-of-death designating rules. Current ICD rules use a categorical or classified system for designating UCDs and assign only 1 cause for each death.2 However, in some cases-for example, heart failure deaths or ill-defined causes of death-several diseases lead to a given death, and the death may have been prevented or postponed by removing any 1 of the contributing disease factors. For public health purposes, understanding the entire chain of diseases that contribute to a given death, particularly for those registered as a GC, is critical for developing a death prevention program. Therefore, assigning each GC multiple UCDs not only conserves the uncertainty about the true underlying cause but also benefits future health policymaking.

The classification performance is highly affected by MCD information. In the absence of MCDs, the most effective model was only approximately 20% accurate, implying that these predictors are limited to the use of inferring potential UCDs. Nonetheless, there was a 16% increase in accuracy, compared with randomly guessing (4% accuracy). Incorporating MCD information boosted the performance of all models by large margins, with MLR having the highest accuracy (83%85%), followed by NB with a variable selection procedure (81%-82% accuracy) and CEM with a variable selection procedure (81%-82% accuracy). Such findings suggest that collecting contributing MCDs should be a necessary step to improving the quality of mortality statistics, regardless of any redistribution model. Notably, by contrast with the absence of MCDs, the model selection process ofNB and CEM dropped most predictor variables (Table D). In otherwords, the MCD information contributed most to the learned models and made most variables redundant or even harmful. We analyzed the information gained by predictors in the NB model and found that MCDs accounted for 33.8% of information gained in the redistribution model (Table F, available as a supplement to the online version of this article at http:// www.ajph.org).

One previous study claimed a stronger preference for the nonparametric method (CEM) over the parametric method (MLR) for fast implementation and weaker assumption.7 However, in the present study, we found that MLR was optimal and less affected by redundant covariates (high robustness). We also found that CEM without a model selection process performed worse than other models by a large margin, suggesting a reappraisal of these redistributing methods. Previously, the major opposition to MLR was that it enforces strong assumptions about how variables are related to the outcome (as a linear predictor). However, CEM also invokes its own assumptions about the underlying probability structure, which is the complete interdependencies among predictors. Such assumptions increase the model complexity of CEM, hence the risk of overfitting (Table G, available as a supplement to the

online version of this article at http://www.ajph.org), especially when the data do not feature such ubiquitous correlative structures.

A naive Bayes model, retaining the advantage of fast implementation yet opposing the assumption of CEM, is therefore proposed. The optimal nonparametric model likely lies within the spectrum of NB (accounting for no interdependencies) and CEM (accounting for all interdependencies). To be sure, we investigated the interdependencies among predictors by calculating their conditional mutual information, of which no strong correlation was found (Table H, available as a supplement to the online version of this article at http://www.ajph.org). We also implemented a "joining" operation in the variable selection procedure, as well as augmented NB models. We found that augmented NB models (TANB, FANB) performed slightly worse than NB, implying that the benefits of accounting for interdependency structures did not outweigh the additional complexity created by augmented models. Likewise, joined variables were rarely included in the variable selection of NB_BSEJ; therefore, we believe that the interdependencies among the predictors in our data are inconsequential.

Although we selected MLR as the optimal model to redistribute GC-coded records, such a decision could change from data set to data set, with varying natures like the level of interdependencies among predictors, percentage of missing information, and size. In particular, our data set is untainted by missing values, but it offers only a few predictors with minor interdependencies. Notably, NB and CEM can conveniently handle missing values by treating them as a distinct category, whereas MLR would, by default, omit the whole observation unless an imputation algorithm was applied. In fact, our supplemental simulation experiment revealed that the performance of MLR deteriorated as the missing information grew, hence leaving NB as the optimal model. Alternatively, if the predictors were correlated, models accounting forvariable interdependencies (e.g., CEM and augmented NB models) would be expected to perform better. Also, the size of the data set could affect the optimal performance of these models. Generative methods (e.g., NB and CEM) converge faster to their asymptotic error, which is, however, usually higher than the asymptotic error of the discriminative approach (MLR).17 In brief, there is hardly a universally optimal method for redistributing GCs in every situation. We suggest that users be aware ofthe nature ofthe data set and pilot different methods before full-scale implementation.

Several limitations need to be considered. First, we have no reference (gold standard) for the true UCD among individuals registered with a GC. Therefore, the validation analysis used only those with a non-GC UCD as the validation reference. Additional chart review or linking of National Health Insurance data are required for model validation. Also, we used an a priori conceptual target list that satisfied pathophysiological plausibility for GC reassignment. However, there is no available evidence that physicians exclusively miscode GC deaths from pathophysiologically related underlying causes.

Vital statistics constitute the basic reference for health policy development. In particular, the mortality rankings provide a general picture for the development ofhealth policies and priority setting. However, without adjustment for GC, the vital statistics are inapplicable for public health purposes, leading to biased vital statistics. Our analysis provides quantitative guidance for a future GC reassignment procedure. This study highlights the potential use of multiple cause of death data to improve the quality of vital data. Our finding deserves attention for vital registration system reform. The attempt to apply a machine learning approach to public health practices also provides insights into the interdisciplinary application of innovative computer science.

CONTRIBUTORS

W.-C. Lo and H.-H. Lin conceptualized and designed the study. T.-C. Ng, W.-C. Lo, and C.-C. Ku did the data analysis and prepared the figures and tables. T.-C. Ng and W.-C. Lo wrote the first draft of the article. All authors contributed substantially to the work presented in this article and to the interpretation of data, critically revised the article, and approved the final article.

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CONFLICTS OF INTEREST

The authors declare no conflicts of interests or financial conflicts.

HUMAN PARTICIPANT PROTECTION

This study was approved by the Research Ethics Committee, National Taiwan University Hospital (institutional review board permit number: 201805047W).

Sidebar

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DETAILS

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Invalidity of an Oft-Cited Estimate of the Relative Harms of Electronic Cigarettes

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ABSTRACT (ENGLISH)

In July 2013, a group of 12 experts in decision science, medicine, pharmacology, psychology, public health policy, and toxicology rated the relative harm of 12 nicotine-containing products by using 14 criteria addressing harms to self and others. The group concluded that combustible cigarettes were the most harmful and that electronic nicotine delivery systems (electronic cigarettes or e-cigarettes) were substantially less harmful than combustible cigarettes. These results have been characterized and repeated in the popular media as e-cigarettes are "95% less risky" or "95% less harmful" than combustible cigarettes. However, as the authors noted in a sweeping statement regarding the shortcomings of their own work, "A limitation of this study is the lack of hard evidence for the harms of most products on most of the criteria." (p224) Despite this lack of hard evidence, Public Health England and the Royal College of Physicians endorsed and publicized the "95% less harmful" assertion. Senior Public Health England staff emphasized the "evidence" underlying the 95% figure, despite the evidence being lacking. Much has been written about the dubious validity of the "95% less harmful" estimate in 2014 to 2016, especially about the paucity of research on the health effects of e-cigarettes available in 2013. After six years of e-cigarette-focused research, which has yielded a growing body of hard evidence regarding harm (see Appendix A, available as a supplement to the online version of this article at http://www.ajph. org, for a nonexhaustive list), the time has come to re-examine that estimate.

FULL TEXT

In July 2013, a group of 12 experts in decision science, medicine, pharmacology, psychology, public health policy, and toxicology rated the relative harm of 12 nicotine-containing products by using 14 criteria addressing harms to self and others.1 The group concluded that combustible cigarettes were the most harmful and that electronic nicotine delivery systems (electronic cigarettes or e-cigarettes) were substantially less harmful than combustible

cigarettes. These results have been characterized and repeated in the popular media as e-cigarettes are "95% less risky" or "95% less harmful" than combustible cigarettes. However, as the authors noted in a sweeping statement regarding the shortcomings of their own work, "A limitation of this study is the lack of hard evidence for the harms of most products on most of the criteria."1(p224)

Despite this lack of hard evidence, Public Health England and the Royal College of Physicians endorsed and publicized the "95% less harmful" assertion.2,3 Senior Public Health England staff emphasized the "evidence" underlying the 95% figure, despite the evidence being lacking. Much has been written about the dubious validity ofthe "95% less harmful" estimate in 2014 to 2016, especially about the paucity of research on the health effects of e-cigarettes available in 2013. After six years of e-cigarette-focused research, which has yielded a growing body of hard evidence regarding harm (see Appendix A, available as a supplement to the online version of this article at http://www.ajph. org, for a nonexhaustive list), the time has come to re-examine that estimate.

TODAY'S ELECTRONIC CIGARETTES ARE DIFFERENT

There is ample evidence that the range of e-cigarette products available today is very different from that in July 2013. The differences are such that, even if the 2013 estimate was valid then, it can no longer apply today. For example, in addition to using different materials and more numerous heating coils, many e-cigarettes today can attain power output that exceeds that of most over-the-counter 2013 models by 10 to 20 times (i.e., up to and sometimes exceeding 200 watts). Greater power increases the potential harms ofe-cigarette use because more aerosol is produced that exposes users to increased levels of nicotine and other toxicants. It also increases bystander exposure to any harmful aerosol constituents because users exhale more aerosol. In addition, greater power increases the potential for malfunction (e.g., the device exploding), which could harm users and bystanders. Also, e-cigarette liquids have changed considerably from 2013, with widespread availability of thousands of flavors that use chemicals "generally recognized as safe" to eat but with unknown pulmonary toxicity. Perhaps the most striking change has been the pervasive marketing of liquids with protonated nicotine.4 Protonated nicotine ("nicotine salt") is made by adding an acid to free-base nicotine, thus introducing another potential toxicant that was rare in 2013. Relative to free-base nicotine, aerosolized protonated liquid is less aversive to inhale, allowing users to increase the nicotine concentration of the liquid and likely increase their own nicotine dependence. Protonated nicotine e-cigarette liquids are available today in concentrations greater than 60 milligrams per milliliter, and these liquids have become very popular, sparking a "nicotine arms race."4

ELECTRONIC CIGARETTES CAUSE HARM TO CELLS

There is ample evidence, unavailable in 2013, that e-cigarette aerosols contain toxicants and that these aerosols are harmful to living cells in vitro and in vivo. For example, thermal degradation of e-cigarette liquid constituents can produce volatile aldehydes, which, at concentrations generated by e-cigarettes, display a variety of cardiorespiratory toxic effects. E-cigarettes can produce carcinogenic furans in addition to other toxicants such as chloropropanols. Even at room temperature, e-cigarette liquids can be unstable, producing irritating acetal compounds carried over into the aerosol. Numerous studies demonstrate that cell function is compromised following exposure to e-cigarette aerosol. Similarly, animals that are exposed to e-cigarette aerosols show clear indication of adverse consequences, including in models related to cardiovascular disease.

ELECTRONIC CIGARETTES HARM USERS

Recent evidence reveals that e-cigarette users show evidence of harm. For example, in a sample of healthy young occasional cigarette smokers who used an e-cigarette with or without nicotine, airway epithelial injury was observed in both conditions, with the authors concluding, "Thus, [e-cigarette] aerosol constituents could injure the respiratory system or worsen preexisting lung disease through a variety of mechanisms."5(pL716) Consistent with this report, wheezing, a symptom of potential respiratory disease, has been associated with e-cigarette use. E-cigarette use increases heart rate, blood pressure, and platelet activation, and decreases flow-mediated dilation and heart rate variability, effects that are prognostic of long-term cardiovascular risk. Indeed, a preliminary report indicates that e-cigarette users may be at increased risk for myocardial infarction and coronary artery disease.6

ELECTRONIC CIGARETTES INCREASE SMOKING RISK

Since 2013, numerous surveys have demonstrated that e-cigarette use is increasing among individuals who previously were naive to nicotine and that these individuals are at increased risk for initiation of combustible cigarette smoking. As the US National Academies of Sciences, Engineering, and Medicine concluded, "There is substantial evidence that [ecigarette] use increases risk of ever using combustible tobacco cigarettes among youth and young adults. "7(p532) To the extent that initial e-cigarette use is a causal factor in subsequent combustible tobacco smoking for an individual who would have otherwise never initiated smoking, e-cigarette use could be considered to be as harmful as tobacco smoking for that individual.

ELECTRONIC CIGARETTE AEROSOL IS NOT HARMLESS

Differences in toxicant content between e-cigarette aerosol and cigarette smoke, by themselves, cannot convey lesser lethality because toxicity depends upon both the extent and mode ofuse. For example, propylene glycol (PG) is one of the primary constituents ofe-cigarette aerosol and is generally recognized as safe when eaten but, when injected intravenously over a period of days, is toxic. E-cigarette aerosols containing propylene glycol and vegetable glycerin, another common constituent, cause inflammation in human lungs, suggesting differing safety profiles for inhaled versus ingested propylene glycol and vegetable glycerin. Furthermore, as the toxicants in e-cigarette aerosol sometimes differ from cigarette smoke, so might any resulting e-cigarette-caused disease states. There is little doubt that exclusive e-cigarette users are unlikely to die from lung cancer that is caused by carcinogenic tobacco-specific nitrosamines or polycyclic aromatic hydrocarbons, toxicants largely absent from e-cigarette aerosols. What diseases they may die of-and if their deaths are hastened by their e-cigarette use- will be part of the much-needed evidence base upon which valid risk estimates can be built.

CONCLUSIONS

In sum, a 2013 evidencelacking estimate of the harm of e-cigarettes relative to combustible cigarettes has been cited often. However, since 2013, e-cigarette devices and liquids have changed. Evidence of potential harm has accumulated. Therefore, the evidence-lacking estimate derived in 2013 cannot be valid today and should not be relied upon further. Future estimates of the harm of e-cigarettes should be based on the evidence that is now available and revised accordingly as more evidence accrues.

CALL TO ACTION

The "95% safer" estimate is a "factoid": unreliable information repeated so often that it becomes accepted as fact. Public health practitioners, scientists, and physicians should expose the fragile status of the factoid emphatically by highlighting its unreliable provenance and its lack of validity today, noting the many changes in e-cigarette devices and liquids, the accumulation of evidence of potential harm, the increased prevalence of use, and the growing evidence that e-cigarette use is associated with subsequent cigarette smoking.

CONTRIBUTORS

All authors contributed equally to this article.

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CONFLICTS OF INTERESTS

T. Eissenberg and A. Shihadeh are paid consultants in litigation against the tobacco industry and are named on a patent for a device that measures the puffing behavior ofelectronic cigarette users. In addition, as ofSeptember 2019, T. Eissenberg is a consultant in litigation against the electronic cigarette industry. S. Jordt reports receiving personal fees from Hydra Biosciences LLC and Sanofi SA and nonfinancial support from GlaxoSmithKline Pharmaceuticals outside the submitted work.

Sidebar

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DETAILS

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Assurances of Voluntary Compliance: A Regulatory Mechanism to Reduce Youth Access to E-Cigarettes and Limit Retail Tobacco Marketing

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ABSTRACT (ENGLISH)

Objectives. To evaluate assurances of voluntary compliance (AVCs) between state attorneys general and retail chains by assessing e-cigarette sales to underage decoys and tobacco marketing violations in corporate-owned stores (that sign AVCs) and franchise stores (that do not sign AVCs). Methods. Decoys 18 to 19 years of age attempted to purchase e-cigarettes without presenting ID in California convenience stores (n = 540). Auditors characterized the presence and content of age-of-sale signage and advertising for tobacco products. Data were collected and analyzed in 2018. Results. Corporate-owned stores were less likely than were franchise stores to violate ID requests (adjusted odds ratio [AOR] = 0.29; 95% confidence interval [CI] = 0.12, 0.71) and to sell e-cigarettes illegally (AOR = 0.37;95% CI = 0.15, 0.88). Regardless of AVC category, advertising violations were common in stores (vaping products, 26.3%;other tobacco products, 74.3%). Conclusions.The differences in violation rates found in corporate and franchise stores implythatAVCs could reduce youth access to e-cigarettes. However, merchant education and routine enforcement are needed to better leverage restrictions on retail tobacco marketing in AVCs. Public Health Implications. Strengthening compliance with existing AVCs and establishing new agreements with retailers shown to be in violation through federal or state inspections could reduce youth access to e-cigarettes and exposure to tobacco marketing. (Am J Public Health. 2020;110:209-215. doi:10.2105/AJPH.2019. 305436)

FULL TEXT

Headnote

Objectives. To evaluate assurances of voluntary compliance (AVCs) between state attorneys general and retail chains by assessing e-cigarette sales to underage decoys and tobacco marketing violations in corporate-owned stores (that sign AVCs) and franchise stores (that do not sign AVCs).

Methods. Decoys 18 to 19 years of age attempted to purchase e-cigarettes without presenting ID in California convenience stores (n = 540). Auditors characterized the presence and content of age-of-sale signage and advertising for tobacco products. Data were collected and analyzed in 2018.

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Public Health Implications. Strengthening compliance with existing AVCs and establishing new agreements with retailers shown to be in violation through federal or state inspections could reduce youth access to e-cigarettes and exposure to tobacco marketing. (Am J Public Health. 2020;110:209-215. doi:10.2105/AJPH.2019. 305436)

Dramatic increases in the prevalence and frequency of vaping among US high school students present a significant obstacle to establishing the first generation free from nicotine addiction.1 Vape products are sold widely in convenience stores, where at least 4.1 million US adolescents (aged 13-16years) shop at least weekly.2 According to 1 study, more youths aged 12 to 17 years who had used flavored JUUL pods in the preceding month reported obtaining these products frombrickand-mortar retailers (74%) than from social sources (52%) and Web sites (10%).3 In addition, the US Food and Drug Administration cited at least 1300 retailers for selling e-cigarettes to minors between June and August 2018.4 In California, where the study described here was conducted, more retailers sold e-cigarettes (22.0%) than cigarettes (17.6%) to underage decoys (18-19 years of age) in2018.5 Amid growing concern about regulating the retail environment for e-cigarettes, interventions are needed to improve compliance with youth access laws.

One regulatory option is to implement assurances of voluntary compliance (AVCs) with retail chains that sell tobacco. AVCs originate in state unfair competition laws and consumer protection laws. Selling an addictive product

to a minor is characterized as an "unfair, deceptive, and/or unconscionable act" for which the corporate parent is held responsible.6^109"1 AVCs are legally binding agreements between states and corporate violators designed to alter organizational training, supervision, and point-of-sale practices.7

Best practices developed by attorneys general in consultation with retailers, researchers, and state tobacco control officials require AVC retail chains to (1) train employees on state and local laws and company policies prohibiting tobacco sales to minors, including explaining the health-related reasons for laws that restrict youth access to tobacco; (2) display additional age-of-sale warnings; and (3) check identification for tobacco purchases by customers who appear to be underage (depending on the AVC). Notably, all AVCs were established before e-cigarettes were regulated as tobacco products in California.7,8 Whether agreements created to remedy repeat violations of underage sales of cigarettes affect sales of e-cigarettes has not been studied.

AVCs cover 15 major retail chains (e.g., pharmacies, supermarkets, convenience stores, and discount department stores) in as many as 47 states.7 However, limited evidence about the effectiveness of AVCs exists.9,10 Using public data from Food and Drug Administration (FDA) inspections, Dai and Catley found that AVCs were associated with lower odds of tobacco sales to minors in supermarkets and convenience stores but not in pharmacies or gas stations.10 The authors suggested that heterogeneity in gas station ownership (e.g., corporate entities vs franchisees) made it more difficult to detect the effects of AVCs on sales-to-minor violations. Because inspection protocols vary from state to state, research with a uniform protocol is needed to examine AVCs within chains rather than between states. As a means of filling these important gaps, we used a standard protocol to compare corporate and franchise stores in the same retail chains.

As binding agreements between parties rather than statutes or regulations, AVCs can restrict the location and content ofadvertising without being subject to First Amendment challenges. For example, AVCs limit the content oftobacco advertising to brand name, logo, and price and restrict placement of tobacco advertising and products to the primary display area (typically behind the counter); also, some AVCs prohibit exterior advertising for tobacco at stores near schools and playgrounds. Unfortunately, compliance with AVC marketing provisions has not been evaluated. Such research is important because retail tobacco marketing involves strategies that appeal to young people.11,12 In addition, greater exposure to retail tobacco marketing near schools is associated with higher odds of vaping and other tobacco use by students.13,14

To the best ofour knowledge, the current study is the first to examine AVC compliance for sales of e-cigarettes to underage decoys and restrictions on tobacco marketing, including vaping products. Convenience stores (with or without gas stations) are the focus of this research because they are the most common type of tobacco retailer and the most common retail source from which US adolescents (15-17 years of age) purchase e-cigarettes.15,16 Among convenience store chains with AVCs that operate in California, these agreements bind the corporate-owned stores and, to a lesser extent, the franchise stores.17 Franchisees never sign the AVCs, possibly limiting the agreements at locations where there is less corporate control. Therefore, we hypothesized that there would be greater compliance (lower odds of violation) among corporate-owned stores (hereafter AVC-corporate) than franchise-operated stores (AVC-franchise).

METHODS

Data were collected in northern California (San Francisco Bay area), the Central Valley (Sacramento, Fresno, and Merced areas), and southern California (greater Los Angeles and San Diego areas) between January and March 2018, approximately 18 months after the state increased the minimum legal sales age for tobacco to 21 years. Senate Bill 7 (2016) removed the provision in California Penal Code section 308(b) making it a crime for a person younger than 18 years to purchase, receive, or possess certain tobacco products.

Sample

We obtained a list of licensed tobacco retailers maintained by the California Department of Tax and Fee Administration in December 2017. Using a search string that included multiple spelling variants,9 we identified all records for a subset of 4 convenience store chains with AVCs in California- 7-Eleven, Chevron, Circle K, and Quik Stop (n = 3046)-from a total of 33 046 licensed tobacco retailers. Across all 4 chains, the state licensing list was

used to categorize stores as AVC-corporate if the corporation was identified as the taxpayer or AVC-franchise if an independent owner was identified as the taxpayer. A target sample size (n = 540) was determined through a power calculation to test whether the sales violation rate was lower in AVC-corporate than AVC-franchise stores. The power calculation assumed a violation rate of 7.3%, equivalent to the rate for conventional tobacco sales in gas and convenience stores in 2017.18

Using ArcGIS 10.4 (Esri, Redlands, CA), we geocoded the sampling frame (mapping rate = 100%) and constructed a 15-mile roadway network buffer around the smallest category of stores: AVC-corporate 7-Elevens (n = 37). We constructed the sample around 34 of these stores, excluding 3 stores in remote parts of the state to reduce travel costs. The AVC-corporate sample included a census of AVC-corporate Circle K and Quik Stops in the 34 buffers; we then randomly sampled AVC-corporate Chevrons, for a total of 270 stores. Similarly, the AVC-franchise sample included a census of Circle K and Quik Stop stores in the 34 buffers and a random sample of Chevrons (n = 133) and 7-Elevens (n = 80). The total sample (n = 540) included stores in 21 of 58 counties.

Data Coiiection

Ewald &Wasserman Research Consultants (San Francisco) recruited 5 underage decoys aged 18 to 19 years (2 of whom were female) from northern and southern California. In a 6-hour training session, the Stanford Prevention Research Center team trained professional auditors and young-adult decoys to use an iPad to record data from 2 tasks: purchase attempts and assessment of retail marketing for tobacco products. Training sessions were conducted in 3 locations to accommodate data collectors from different regions and included mock purchase attempts and field practice in nonsample stores. The 5 pairs of underage decoys and professional auditors collected data from January 31 to April 4, 2018. Notably, neither decoys nor auditors had information as to whether stores were categorized as AVC- corporate or AVC-franchise.

E-Cigarette Purchase Task

Following a standard protocol, decoys carried $20 in small bills and attempted to purchase any flavor of Vuse cartridges without presenting identification and without lying about their age.19 Our budget did not accommodate purchase requests for higher-priced JUUL pods, the top-selling brand at the time of data collection.19 If Vuse was not sold, decoys were instructed to purchase another brand; if no e-cigarette cartridges were sold, they were instructed to purchase a flavored cigarillo.

Regardless of whether a tobacco product was purchased, decoys were debriefed by the auditor, who recorded what product was requested, whether ID was requested, whether a product was sold, the clerk's gender and perceived age (older than 25 years [yes/no]), and the number of customers in line (0, 1,2, 3, 4 or more). Purchased products were sealed in plastic bags and labeled with a unique number for each store.

Retail Marketing Assessment

Immediately after the purchase attempt debrief, professional auditors entered the store to assess retail marketing for vape and other tobacco products. Auditors used an iPad mini with an AVC field inspection form from the Arizona Attorney General's Office that we adapted and programmed in Qualtrics (Qualtrics, Provo, UT).20 Separately for vape and conventional tobacco products, auditors recorded the presence of self-service displays, whether products and advertising were restricted to a single display area, the presence of interior and exterior advertising, and whether advertising content was limited to brand name, other trademarks or logos, and price. Auditors recorded the store brand (7-Eleven, Chevron, Circle K, Quik Stop, other) and assessed whether age-of-sale reminders were located near every register where tobacco was sold. They noted the presence of and oldest age mentioned (e.g., under 30 years, 27 years, 21 years) on signage in the main tobacco display area and on the store exterior near the entrance. Survey instruments and training materials are available on request.

Interrater Reliability

Auditors also conducted marketing assessments in a subset of stores (n = 29) they had not visited previously. Interrater reliability was assessed separately for advertisements of vaping products and conventional tobacco products. Given the lack of variability for multiple measures and the small sample size, we computed percentages of agreement for the following: age-of-sale signage, products outside the main display area, interior ads outside the

main display area, self-service displays, interior content-limited advertising, and exterior advertising. We computed Cohen's k values for age-of-sale signage and presence of exterior advertising.

Distance to Schools

We computed the Euclidean distance from each store to the nearest K-12 school boundary using GIS shapefiles that we obtained or created for public schools.21 For private schools, we geocoded an address list obtained from the California Department of Education (mapping rate = 99.8%) using ArcGIS version 10.4. Stores were coded as being near a school if the location was either 500 feet from a public school boundary or 1000 feet from a private school address point. The reason for the larger distance from private schools was to accommodate imprecision in address point estimates.22 For the subsample ofstores near schools, the presence ofexterior advertising for any tobacco products was coded as a violation except at Chevron, which did not have this restriction (Table 1).

Analysis

There were different analysis samples for purchase and marketing outcomes. For the total sample of 540 stores, all analyses excluded stores that had different retail chain names in the field than appeared on the state retail licensing list (n = 17), closed stores (n = 8), tobacco retailers whose licenses had been suspended (n = 1), and stores with missing data for both tasks (n = 2). For purchase attempts, the analysis sample (n = 458) also excluded stores in which decoys attempted to purchase a cigarillo (n = 47) and stores with incomplete data (n = 7). For outcomes from the marketing assessment, the analysis sample was restricted to cases with complete data (n = 510), regardless of purchase attempt. Analysis of marketing specific to vaping products excluded stores where these products were not sold (n = 34).

All outcomes were coded to indicate violation of AVCs. For example, purchase task outcomes were whether ID was requested (1 = no, 0 = yes) and illegal sale ofe-cigarettes (1 = yes, 0 = no). From the marketing assessment, violations were coded to match brand-specific AVC provisions (Table 1). For example, a violation was coded ifretailers did not display age-of-sale signage that was compliant with the appropriate minimum age (30 years for Chevron and Circle K, 27 years for 7-Eleven, 21 years for Quik Stop) or if signs were not displayed at the required locations. Outcomes related to product placement and advertising were coded separately for conventional tobacco and vaping products. We coded violations for product placement (e.g., products outside display areas, self-service displays) and presence of interior advertising that did not meet content-limited restrictions. In an open-ended response format, data collectors were asked to make notes about what advertising content violated the restrictions. Retail violation rates (RVRs) were calculated by summing the number of stores with a violation, dividing by the total observations, and then multiplying by 100. RVRs are reported overall and by store type. Simple logistic regression models tested whether AVC-corporate stores were less likely than AVC-franchise stores to violate AVC restrictions (AVC-corporate = 1, AVC-franchise = 0), as indicated by odds ratios (ORs) below 1.0. Adjusted models controlled for store location near a school and store brand, with the most common brand coded as the referent category. It was impractical to randomly assign decoy-auditor pairs to stores located in 21 counties across northern, central, and southern California. Therefore, models for ID requests and sales outcome controlled for decoy, and models for marketing outcomes controlled for auditor. SPSS version 25 (SPSS Inc, Chicago, IL) was used in conducting all analyses.

RESULTS

Table 2 summarizes the counts and distributions of 4 convenience store brands within AVC categories for stores that were included in either the purchase task or the marketing assessment (n = 512).

Retail Violations

Overall, 6.6% of stores did not request IDs, and the same percentage sold e-cigarettes illegally, but they were not the same stores. Indeed, 16.7% of illegal sales occurred in stores where clerks requested IDs and decoys did not present one. As expected, violations of age-of-sale signage regulations and ID requests were less common in AVC-corporate than in AVC-franchise stores (Table 2). Regardless ofAVC category, however, more than half of convenience stores (53.1%) did not post the required age-of-sale signage.

Table 3 presents unadjusted and adjusted odds ratios from logistic regressions examining whether AVC-corporate

stores were more compliant than were AVC-franchise stores. After adjustment for store brand and auditor, AVC-corporate stores were significantly less likely to violate age-of-sale signage regulations (adjusted OR [AOR] = 0.16; 95% confidence interval [CI] = 0.10,0.25). In models that adjusted for store brand and decoy, AVC-corporate stores were significantly less likely to violate ID requests (AOR = 0.29; 95% CI = 0.12, 0.71) and less likely to sell e-cigarettes to underage decoys (AOR = 0.37; 95% CI = 0.15, 0.88; Table 3). Although sales violations were more common at convenience stores near schools (RVR = 10.1%) than at other stores (RVR = 5.8%), the difference was not statistically significant (AOR = 2.56; 95% CI = 1.00, 6.56; Table 3).

Marketing Outcomes

Percentage agreement between auditors ranged from 70% to 100% for all measures with the exception of content-limited advertising for vaping products (interior advertising percentage agreement = 38.5%). The definition ofcontent-limited advertising is imprecise, which made it difficult to train auditors and likely contributed to low reliability. Cohen's k values were 0.78 for age-of-sale-signage, 0.54 for exterior advertising, and 0.58 for conventional tobacco sales, implying that assessments were somewhat subjective, fidelity to protocol was questionable, or signage changed between visits.

The majority of stores violated AVC regulations on interior content-limited advertising for any tobacco: RVRs were 81.5% for AVC-corporate stores and 71.9% for AVC-franchise stores. Contrary to expectations, AVC-corporate stores were significantly more likely to violate interior content-limited advertising regulations for conventional tobacco products (AOR= 1.89; 95% CI= 1.19, 3.02; Table 3). Although the same pattern was observed for vaping products in an unadjusted model (OR = 1.58; 95% CI = 1.04, 2.39), the association was attenuated in an analysis that adjusted for auditor (AOR = 1.47; 95% CI = 0.89, 2.42; Table 3).

Auditors' notes about marketing violations included signs with images of branded products that show what is inside the package, other imagery, and signs with promotional language other than price. Examples of content-limited advertising violations included product imagery (e.g., cigarettes inside a pack of Marlboro Ice), tobacco advertising with fruit and floral imagery, and advertising slogans (e.g., "Real. Simple. Different"; "Cool to the finish"; "A cut above the rest"; "Experience intensely satisfying vapor"). Other examples noted as violations were advertisements for mobile coupons for cigarettes and smokeless tobacco.

As shown in Table 4, tobacco products placed outside primary display areas were uncommon in both AVC-corporate and AVC-franchise stores. Few stores (1.2% of AVC-corporate and 3.5% of AVC-franchise) displayed any tobacco products outside the primary display area. Self-service displays were also uncommon. Only 1 store (an AVC-corporate store) had a self-service display for vaping products. Among AVC-franchise stores, 10 had self-service displays for vaping products and 1 had self-service displays for conventional tobacco.

Overall, 16.8% of stores were located near at least 1 K-12 school. Of these 86 stores, 46 were subject to AVC-specific requirements on advertising restrictions near schools. In this subset of convenience stores, RVRs for presence of exterior advertising were 10.9% for vaping products and 73.9% for other conventional products.

DISCUSSION

Relative to AVC-franchise stores, AVC- corporate stores were significantly less likely to violate ID checks and less likely to sell e-cigarettes illegally to underage decoys. Only the sales violation rate in AVC-corporate stores (4.7%) satisfied the Healthy People 2020 goal of 5.0%.23 This finding is noteworthy because AVCs were established before e-cigarettes were regulated as tobacco products in California. The difference between corporate and franchise stores may also explain why AVCs have not appeared to be uniformly effective in studies involving FDA compliance data.10 Our study suggests that improvements in retail education and enforcement of AVCs are needed to close the gap between corporate and franchise stores.

Our study also documented substantial noncompliance with age-of-sale signage and the marketing provisions of AVCs. Even though AVC-corporate stores were less likely than were AVC-franchise stores to violate age-of-sale signage, it is noteworthy that more than halfofconvenience stores (overall) were noncompliant. Violations of content-limited advertising were noted in 76.7% of stores overall, and violations were more common in AVC-corporate stores. This poor compliance may have resulted from ambiguity in the provisions, lack ofdirection from corporate

headquarters, lack of enforcement, or a combination of these factors. Poor compliance may also have been the result of individual business decisions to sell or advertise tobacco products or agreements between retailers and tobacco companies to display marketing materials that do not conform with AVC provisions.24 Our results indicate that clarifying and enforcing restrictions on advertising limited to trademark, logo, and price will be important in leveraging the unique capacity of AVCs to limit retail tobacco marketing.

Strengths and Limitations

Strengths of this study include a statewide sample of convenience stores and a "blinded" procedure such that decoys and auditors did not know which category each store represented. In addition, a design that compared corporate and franchise stores in the same chains fills a documented gap in previous research.10 Another strength is the use of standard protocols, with training materials and an electronic data collection instrument that are available on request.

Although good reliability was obtained on most measures, lower reliability on content-limited advertising, exterior advertising, and age-of-sale signage may be indicative of poor fidelity to protocols and disagreement about how to interpret AVC requirements. The interrater reliability of purchase task assessments (e.g., clerk gender, age, number of customers in line) was not measured because decoys and auditors were not in stores at the same time. In addition, there was imprecision in estimates for stores near private schools relative to public schools. Of the 36 stores within 500 feet of a public school boundary, 30.6% had an address point that was more than 1000 feet from a store. This suggests that the number of stores near private schools was more likely underestimated than overestimated.

With the corporate-franchise comparison as a proxy for convenience stores with and without AVCs in the same retail chains, greater compliance in corporate than franchise stores implies that AVCs could reduce illegal sales of e-cigarettes to minors. However, future research could compare (1) stores with and without AVCs in the same chain (e.g., Safeway stores in states that did or did not sign AVCs), (2) stores from AVC and non-AVC chains in the same retail sector, or (3) data collected before and after implementation of a new AVC. A rigorous design would randomly assign decoys and auditors to stores, a limitation of our study and many others focusing on youth access.25 In addition, we did not examine compliance with the training requirements of AVCs, another limitation that future research should address.

Public Health Implications

Corporate retail chains with a history of violations can change their behavior by improving employee training, sales practices, and marketing. To address growing concerns about underage access to vape products,26 state attorneys general could expand AVCs from convenience stores, supermarkets, pharmacies, and gas stations to other types of retail chains, such as dollar stores and smoke or vape shops. New AVCs should be established with brick-and-mortar retailers that have already received warning letters or fines after FDA inspections (e.g., Dollar General, Family Dollar, Marathon, Avail Vapor, Madvapes, Vapor Shark).27 AVCs may be valuable in proactively bringing about changes without the necessity of other regulatory actions. In acknowledgment that tobacco retailers and manufacturers may exploit regulatory gaps,28 AVCs should supplement (rather than supplant) other policies, such as strong requirements for tobacco retail licensing and comprehensive "tobacco 21" laws.29,30

Evidence that California convenience stores violated marketing provisions of AVCs merits attention from the state attorney general. Greater investment in enforcement of AVC marketing provisions is warranted, particularly given that exposure to retail tobacco marketing is a risk factor for tobacco initiation.31,32 Indeed, the potential for AVCs to reduce exterior advertising of tobacco at stores near schools is particularly novel. New AVCs could strengthen requirements for stores near schools, such as increasing school zones (e.g., from 500 to 1000 feet, as with local policies in California and elsewhere) and limiting advertising for flavored tobacco products that appeal to youths. Existing surveillance mechanisms could be expanded to integrate reporting on AVC-relevant ageof-sale signage and advertising measures, which have already been implemented in Florida and Pennsylvania.

AVCs provide a mechanism for state attorneys general to engage directly with tobacco retailers, thereby adding to Master Settlement Agreement efforts with manufacturers.7 Without AVCs, state attorneys general would not be

involved with sales to minors in most states. Although some AVC provisions have been incorporated into state and local regulations over the past decade, this mechanism offers further opportunities for unique areas of enforcement.

CONTRIBUTORS

L. Henriksen and N. C. Schleicher originated and designed the study in collaboration with J. G. L. Lee. T. O. Johnson managed the survey development and data collection. N. C. Schleicher analyzed the data. L. Henriksen drafted the article. All of the authors revised the article for critical content.

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CONFLICTS OF INTEREST

J. G. L. Lee receives licensing royalties from a store audit and compliance and mapping system owned by the University of North Carolina at Chapel Hill; the system was not used in this study. The other authors have no conflicts of interest to report.

HUMAN PARTICIPANT PROTECTION

The research protocol was approved by the institutional review board of the Stanford University School of Medicine with a waiver ofinformed consent.

Sidebar

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DETAILS

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Location:	United States--US; California
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A Pornography Literacy Program for Adolescents

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ABSTRACT (ENGLISH)

In 2016, in response to concern about the impact of pornography on adolescents, the Boston Public Health Commission partnered in 2016 and 2019 (n = 31). Many adult teachers of sex education also expressed interest in being trained to use the curriculum, so our team has now trained 300 adults to use it. (Am J Public Health. 2020; 1 10:154-156. doi:10.2105/ AJPH.2019.305468)

FULL TEXT

Headnote

In 2016, in response to concern about the impact of pornography on adolescents, the Boston Public Health Commission partneredwith a universityresearcher to develop a nine-session media literacy curriculum on pornography for adolescents. The curriculum was pilot-tested with five small classes of adolescents between 2016

and 2019 (n = 31). Many adult teachers of sex education also expressed interest in being trained to use the curriculum, so our team has now trained 300 adults to use it. (Am J Public Health. 2020; 1 10:154-156. doi:10.2105/AJPH.2019.305468)

Since 2016, US state legislatures have been passing resolutions declaring pornography a public health crisis. There is particular concern that the accessibility of Internet pornography may harm adolescents. The evidence regarding the impact of pornography on adolescents is mixed,1 although there is little doubt that media literacy skills help adolescents think critically about sexualized and nonsexualized media to which they are exposed.2 Therefore, we developed an educational program for adolescents about pornography. Here, we relay some information about the program to alert the public health community to its existence. Details about the development of the program and its possible impact are available elsewhere.3,4

INTERVENTION

We developed a nine-session curriculum called "The Truth About Pornography: A Pornography Literacy Curriculum for High School Students Designed to Reduce Sexual and Dating Violence." The theoretical underpinnings of the program are the Theory of Planned Behavior and the 3AM theory.5,6 The goals of the program are to improve knowledge about sexually explicit media and sexual behavior, to increase attitudes consistent with valuing sexual consent and nonaggression in dating relationships, and to increase awareness about media's power to promote social norms. The expectation is that by providing information; by encouraging critical thinking, self-reflection, and the reevaluation ofpeer beliefs and social norms; and by practicing new behaviors via role play, some adolescent knowledge, beliefs, and behavioral intentions will change. The nine topics covered in the class are as follows:

1. the rationale for the class;
2. the history of obscenity regulations;
3. social norms related to gender, sex, and violence;
4. the debate about pornography addiction and information about compulsive use;
5. different types of intimacy explained;
6. healthy flirting and setting boundaries;
7. commercial sexual exploitation;
8. the nonconsensual dissemination ofsexually explicit images and sexting laws; and
9. how to talk with peers about pornography.

In addition to creating the curriculum, we developed a onesession training program for adults who want to teach it. This is an unfunded initiative; this team has received no governmental orprivate funding to support this work.

PLACE AND TIME

We pilot-tested the curriculum with five small groups of adolescents in Boston, Massachusetts between July 2016 and November 2019 (n = 31). The primary audience for our curriculum has been the adolescents who join the Boston Public Health Commission (BPHC) Start Strong program, which works with only 20 adolescents per school year. We also separately provided one class to a group of lesbian, gay, bisexual, transgender, queer, and pansexual (LGBTQP) youths at a local nonprofit. The curriculum was designed to be used with small classes to facilitate conversation. For these reasons, few adolescents have been through the class.

Many adult educators have been curious about our curriculum and requested training to teach it themselves. We have provided training to over 300 adults from places as diverse as Hawaii, Vermont, Utah, Canada, the United Kingdom, Australia, and Japan.

PERSON

The curriculum was originally designed for high school students participating in the BPHC Start Strong program-a program that trains adolescents to become peer educators about healthy dating relationships. It is not a school program. The training for adults on how to use the curriculum was designed for sex educators, clinicians who work with youths who sexually offend, teachers, advocates for commercially sexually exploited youths, pregnancy prevention experts, public health professionals, religious and nonreligious youth group leaders, and child protective services workers.

PURPOSE

The curriculum was designed to improve adolescents' knowledge, attitudes, and behavioral intentions related to pornography, healthy relationships, and sexual consent. For example, participants learn that pornography is created for entertainment and generally not for instructional purposes. The curriculum also seeks to improve knowledge about adolescent-specific risk behavior related to pornography, including the legal risks of sending or receiving nude photos. The curriculum was designed to change beliefs about, for example, performing in pornography being an easy way to become wealthy, or pornography being realistic. Finally, the curriculum uses a nonjudgmental approach to sexual behaviors and sexual interests and was not designed to persuade adolescents to stop pornography use. However, it does seek to improve behavior related to sexual consent and dating violence. For example, participants learn that not everyone enjoys being called names like "slut" during sex and that they need to ask partners for consent before each new sexual act that they may want to try during a sexual encounter (e.g., anal sex, hair-pulling, and spanking would each require separate consent, and may not be as widely enjoyed by women as they might presume after watching mainstream pornography).

IMPLEMENTATION

The program comprises nine 60-minute sessions. It is implemented by two trained facilitators. Our team has trained adolescents who graduate from the class to become peerfacilitators for new groups of students. The training for adults takes three to six hours to deliver. Our team is now exploring an online format for delivering the training to adults.

EVALUATION

We evaluated the adolescent curriculum by using a nonexperimental, one-group, preand posttest design.3 Detailed evaluation information is available elsewhere,3 and additional selected findings are presented in Table 1. Results suggest that, on average, youths who have participated in the program have experienced changes in knowledge, attitudes, and behavioral intentions related to pornography, but a larger-scale, randomized design with a longer-term follow-up would improve what is known about the impact of the program. The adult training has not been evaluated. Information about whether the adult training is effective, and whether in turn the adults who are trained are able to provide effective education to their own classes of adolescents, will be useful to the field.

ADVERSE EFFECTS

We have not observed any adverse effects of the program. Prior to implementing the program, we wondered if participating youths would be more likely to seek out pornography as a result of the class. However, pre- and posttest survey results indicate that the percentage of participants who had ever seen Internet pornography had not changed over time (Table 1). Other possible adverse effects include youths feeling anxious or upset as a result of program content, or youths disclosing experiences of abuse or neglect during a session that would necessitate filing a report with child protective services. Neither of these possibilities has occurred.

SUSTAINABILITY

The program is low cost to implement. The primary costs are the time of the facilitators, the meeting space, and materials such as markers, paper, and printing handouts. Many of these costs can be absorbed by existing programs. We are investigating options for providing the adult facilitator with training online to make training accessible and inexpensive.

PUBLIC HEALTH SIGNIFICANCE

This program represents a new way to approach the topic of pornography with adolescents, and is an addition to the porn literacy education curricula that have begun to emerge from around the world.7 Pornography viewing is common among adolescents, and there is a potential that uncritical viewing may contribute to unhealthy attitudes about sexual consent, dating violence, and commercial sexual exploitation. However, the potential harms of pornography are frequently exaggerated in the general news media, and antipornography activism has the potential to encourage stigmatization of sexual orientation and gender minorities and of sex workers. This program is designed to help adolescents think critically about the potential harms of making, viewing, and disseminating sexually explicit media, but it allows for the possibility that not all pornography is innately harmful.

CONTRIBUTORS

E. F. Rothman conceptualized the research and conducted the analysis. E. F. Rothman, N. Daley, and J. Adler contributed to the design and implementation of the research and to the writing of the manuscript.

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We thank the adolescents who participated in the pornography literacy curriculum pilot testing.

CONFLICTS OF INTEREST

Each ofthe authors received honoraria and travel expense reimbursement for participating in speaking engagements related to the pornography literacy curriculum described.

HUMAN PARTICIPANT PROTECTION

This research was approved by the Boston University Medical Campus institutional review board.

Sidebar

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DETAILS

Subject:	Teachers; Media literacy; Public health; Adolescents; Curricula; Literacy; Sex education; Violence; Pornography; Sex industry; Secondary school students; Consent; Sexual behavior; Adults; Health care; Pornography &obscenity; Design; Mass media; Attitudes; Education; Teenagers; Sexual consent; Social norms
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Trends in E-Cigarette, Cigarette, Cigar, and Smokeless Tobacco Use Among US Adolescent Cohorts, 2014–2018

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ABSTRACT (ENGLISH)

Objectives. To examine changes in age of initiation of e-cigarette, cigarette, cigar, and smokeless tobacco use among adolescents in the United States. Methods. We used data from 5 cohorts of the National Youth Tobacco Survey (20142018;n = 26 662). Results. In 2014,8.8% of lifetime e-cigarette users initiated use at 14 years or younger, as compared with 28.6% of lifetime e-cigarette users in 2018. There was no such change in initiation ages for cigarettes, cigars, and smokeless tobacco among lifetime users of each of these products. Conclusions. US adolescents are initiating e-cigarette use at younger ages in recent years. This is concerning given the association of e-cigarette use with subsequent cigarette use. Continued surveillance of these trends and additional prospective research are needed. Tobacco prevention programs, policies, and regulations that make it more difficult for youths to obtain e-cigarettes are warranted. (Am J Public Health. 2020;110: 163-165. doi:10.2105/AJPH.2019.305421)

FULL TEXT

Headnote

Objectives. To examine changes in age of initiation of e-cigarette, cigarette, cigar, and smokeless tobacco use among adolescents in the United States.

Methods. We used data from 5 cohorts of the National Youth Tobacco Survey (2014- 2018; n = 26 662).

Results. In 2014, 8.8% of lifetime e-cigarette users initiated use at 14 years or younger, as compared with 28.6% of lifetime e-cigarette users in 2018. There was no such change in initiation ages for cigarettes, cigars, and smokeless tobacco among lifetime users of each of these products.

Conclusions. US adolescents are initiating e-cigarette use at younger ages in recent years. This is concerning given the association of e-cigarette use with subsequent cigarette use. Continued surveillance of these trends and additional prospective research are needed. Tobacco prevention programs, policies, and regulations that make it more difficult for youths to obtain e-cigarettes are warranted. (Am J Public Health. 2020;110: 163-165. doi:10.2105/AJPH.2019.305421)

E-cigarette use has increased among adolescents in the United States over the past decade, with more than 1 in every 10 US high school students reporting past-month use.1,2 Data from 2014 demonstrate e-cigarette initiation beginning as early as 7 years, with a mean age of 17.5 years.3 Despite this concerning increase in e-cigarette use since the introduction ofe-cigarettes to the US market in the mid-2000s,4 there remains a gap in knowledge regarding whether age at initiation of e-cigarette use is changing.

The literature demonstrates the risks associated with early initiation of cigarettes, including later dependence, difficulty quitting, risk for other substance use,5-7 and physical health risks including lung damage.8 Less research to date has focused on age at initiation of e-cigarette use. One study showed that early use was associated with an increased risk of subsequent cigarette use.9

Although the increasing prevalence of e-cigarette use is well documented, no studies to our knowledge have examined whether age at initiation ofe-cigarette use has changed across time and how changes in initiation of e-cigarettes compares with changes in initiation ofother tobacco products. The purpose of this study was to examine trends in age of initiation of e-cigarettes across 5 cohorts and how these trends compare with those observed for other tobacco products in a large, nationally representative sample of young people in the United States.

METHODS

The National Youth Tobacco Survey (NYTS) annually surveys a cross-sectional, nationally representative sample of middle school and high school students (6th-12th grade) in public and private schools in the United States. The NYTS involves a multistage sampling procedure at the county, school, and student levels. The average response rate for the survey is 76.2%.10

Our study focused on youths 16 and 17 years of age to (1) provide for the possibility of e-cigarette initiation beginning at 12 years old and earlier (e-cigarettes emerged in the US market when the 2014 cohort of 16- and 17-year-old youths would have been 11 and 12 years old4) and (2) allow all in the sample to have had the opportunity to initiate e-cigarettes through the ages of 16 and 17 years. A total of26 662 youths 16 and 17 years old participated in the NYTS between 2014 and 2018. Each trend analysis was restricted to those reporting lifetime use of the relevant tobacco product (8918 e-cigarette users, 7936 cigarette users, 6639 cigar users, 2946 smokeless tobacco users). The sample was 49.9% male and 67.1% White, and was evenly split between youths 16 (51.5%) and 17 (48.5%) years old. Given that age at first e-cigarette use was introduced to the NYTS in 2014, we used this year as the starting point for assessing trends.

As a means of assessing age at first e-cigarette, cigarette, cigar, and smokeless tobacco use, respondents were asked "How old were you when you first tried [an ecigarette, cigarette smoking, cigars/cigarillos/ little cigars, chewing tobacco/snuff/dip], even once or twice?" The response options ranged from 8 years or younger to 19 years or older. Age categories were recoded as 12 years or younger, 13 years, 14 years, 15 years, 16 or 17 years, and never used. The results reported here focus on those initiating use at 14 years or younger and 16 or 17 years.

We used design-based %2 tests to examine age at initiation among lifetime users of e-cigarettes, cigarettes, cigars, and smokeless tobacco across 5 age cohorts. The analyses included weights to account for the complex 3-stage sample design. When estimating standard errors, we used specialized variance estimation techniques to accommodate complex sample design features.10

RESULTS

Figure 1 shows ages at initiation of use among lifetime users ofe-cigarettes, cigarettes, cigars, and smokeless tobacco for each ofthe 5 cohorts from 2014 to 2018. Among lifetime e-cigarette users, 63.0% initiated use at 16 or 17 years old in 2014, as compared with 42.7% in 2018. Conversely, 8.8% and 28.6% of lifetime e-cigarette users initiated use at 14 years or younger in 2014 and 2018, respectively. The difference in initiation of e-cigarette use between age cohorts was statistically significant (%2 = 17.46; P< .001).

By comparison, there were no significant cohort differences in age of initiation of cigarette use (%2 = 1.62; P = .077), cigar use (c2 = 0.985; P = .464), or smokeless tobacco use (C2 = 1.30; P = .212). Among lifetime cigarette users in particular, 55.8% initiated cigarette use at 14 years or younger in 2014, as compared with 51.3% in 2018.

DISCUSSION

This study examined age at initiation of e-cigarette use versus use of other tobacco products in cohorts of 16- and 17-year-old lifetime tobacco users from 2014 to 2018. We found that age of initiation of e-cigarette use was younger among more recent cohorts. Thus, not only are more youths reporting e-cigarette use,1,2 but they are also beginning to use e-cigarettes at earlier ages.

Importantly, this decline in age of initiation was specific to e-cigarettes; we did not see differences for cigarettes, cigars, or smokeless tobacco products. These differing trends could reflect the longer existence of other tobacco products in the market and the consistent proportion of younger adolescents initiating use of these other products relative to e-cigarettes. Although we did not see significant cohort differences in age of initiation of other tobacco products, early initiation of cigarette use remains an endemic problem, with more than one quarter of cigarette users starting by 12 years of age. Data from the Monitoring the Future survey show that cigarettes are still the first product used by most tobacco (cigarette and e-cigarette) dual users, but the proportion of adolescents who begin with e-cigarettes is increasing.11 Taken together, trends toward earlier initiation of e-cigarette use, e-cigarettes increasingly serving as a starter tobacco product, and increases in adolescent e-cigarette use prevalence signal a significant public health concern.

The earlier initiation of e-cigarette use in the most recent cohorts of adolescents is particularly alarming given

research showing that early initiation of e-cigarettes is associated with a subsequent risk for cigarette use.9 Nicotine exposure earlier in development, when the brain is continuing to mature, may confer particular risk.12 Recent reports linking e-cigarettes to respiratory illnesses add to the health concerns of early e-cigarette use (see http://bit.ly/2mscQfffor the recent Food and Drug Administration [FDA] press release). Future research should examine how early e-cigarette use is associated with subsequent tobacco use and health risks in adulthood and whether recent federal actions enforcing regulation of flavored tobacco products will influence these trends of earlier use (see http://bit.ly/2ksVuhI for the FDA announcement).

This study has limitations, including a reliance on self-reported data and omission of some tobacco products (e.g., hookah products). Also, given the cross-sectional nature of the data, we relied on retrospective reports of age of initiation, introducing the potential for recall bias.

Ongoing surveillance of these initiation trends is warranted to monitor whether age at initiation continues to decrease. Given our findings, tobacco prevention programs addressing e-cigarette use may need to tailor risk communications and policy efforts to youths of younger ages to deter initiation.

PUBLIC HEALTH IMPLICATIONS

Public policies that restrict access to e-cigarettes and e-liquids and denormalize their use should be paramount priorities given the increasing number of adolescents initiating use early. ĀĮPU

CONTRIBUTORS

AH of the authors made significant contributions to the article. R. Evans-Polce designed the study and wrote the first draft of the article. P. Veliz performed the statistical analysis. P. Veliz and S. E. McCabe assisted R. Evans-Polce with refining the analysis and interpreting results. P. Veliz, S.E. McCabe, C.J. Boyd, and V. V. McCabe all assisted with editing the article.

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CONFLICTS OF INTEREST

The authors declare no conflicts of interest.

HUMAN PARTICIPANT PROTECTION

No protocol approval was needed for this study because no human participants were involved.

Sidebar

ABOUT THE AUTHORS

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DETAILS

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Early-Life Exposome and Lung Health

Mugore, Matinatsa; Kalia, Vrinda; Lewandowski, Stephen A; Gaspard, Naomi

FULL TEXT

The European Human Early-Life Exposome cohort comprises children born between 2003 and 2009 and pooled from existing cohorts in France, Greece, Lithuania, Norway, Spain, and the United Kingdom. The study involved 1033 mother-child pairs. The authors measured the effect of 85 environmental exposures during pregnancy and 125 exposures after birth on lung function in children aged 6 to 12 years. Using forced expiratory volume to measure lung health, they report a negative association between 2 chemical exposures during pregnancy, a positive association with distance from nearest road during pregnancy, and a negative association with 9 exposures after birth. Reduced early-life exposure to ubiquitous chemicals can prevent chronic respiratory disease later in life. Citation. Agier L, Basagaña X, Maitre L, et al. Early-life exposome and lung function in children in Europe: an analysis of data from the longitudinal, population-based HELIX cohort. Lancet Planet Health. 2019;3(2):e81-e92.

DETAILS

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Should Public Health Professionals Consider Pornography a Public Health Crisis?

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ABSTRACT (ENGLISH)

Since 2016, 17 US states have introduced nonbinding resolutions declaring pornography a public health crisis. Evidence suggests that although pornography may elevate risk for certain health outcomes, pornography itself is not a crisis.

FULL TEXT

Since 2016, 17 US states have introduced nonbinding resolutions declaring pornography a public health crisis (Table 1). Evidence suggests that although pornography may elevate risk for certain health outcomes, pornography itself is not a crisis.

TERMINOLOGY

Social scientists commonly define pornography as sexually explicit materials intended to arouse. According to the Oxford Handbook of Public Health Practice (Oxford, UK: Oxford University Press; 2013), a public health crisis has three main qualities: (1) it is an acute event that requires an immediate response; (2) the event is expected to imminently lead to death, infectious disease morbidity, property destruction, or population displacement; and (3) it overwhelms the capacity oflocal systems to do the job of maintaining a community's health.

US STATE RESOLUTIONS

In 2016, Utah became the first state to pass a resolution declaring pornography a public health crisis. All subsequent states have introduced resolutions using similar or identical language. Resolution language originated from theologically conservative Christian advocacy groups,1 not from public health agencies. Generally, the resolutions declare that pornography leads to risky sexual behavior, affects brain development and functioning, is potentially addictive, and increases infidelity. Further, they declare that pornography normalizes violence, which leads to increases in sex trafficking, prostitution, childhood sexual abuse, and child pornography. Some of these contentions are supported by research, others are partially supported, and some are unsupported. The text of the recently passed Arizona HCR2009 (http://bit.ly/2s7FoxA) provides a good example:

Whereas, pornography is a crisis leading to a broad spectrum of individual and public health impacts; and

Whereas, pornography perpetuates a sexually toxic environment that damages all areas of our society; and

Whereas, potential detrimental effects on pornography users include toxic sexual behaviors, emotional, mental and medical illnesses and difficulty forming or maintaining intimate relationships; and

Whereas, recent research indicates that pornography is potentially biologically addictive and requires increasingly shocking material for the addiction to be satisfied. This has led to increasing themes of risky sexual behaviors, extreme degradation, violence and child pornography; and

Whereas, pornography is directly harming our nation's youth by contributing to the hyper-sexualization of teens and even children; and

Whereas, due to the advances in technology and the universal availability of the internet, children are being exposed to pornography at an alarming rate, leading to low self-esteem, eating disorders and an increase in problematic sexual activity at ever-younger ages; and

Whereas, exposure to pornography often serves as sex education for children and shapes their sexual templates, teaching them that women are commodities for the viewer's use;

Whereas, pornography normalizes violence and the abuse of women and children by treating them as objects, increasing the demand for sex trafficking, prostitution and child pornography; and

Whereas, the use of pornography has an adverse effect on the family as it is correlated with decreased desire in young men to marry, dissatisfaction in marriage and infidelity; and
Whereas, the societal damage of pornography is beyond the capability of the individual to address alone; and
Whereas, to counteract these detrimental effects, this state and the nation must systemically prevent exposure and addiction to pornography, educate individuals and families about its harms and develop pornography recovery programs.
Therefore, be it resolved by the House of Representatives of the State of Arizona, the Senate concurring: That the Members of the Legislature denounce pornography as a public health crisis.
IS PORNOGRAPHY A PUBLIC HEALTH CRISIS?
On the basis of the existing evidence, we believe that some pornography harms the health of some people, but that it does not meet the criteria of a public health crisis, for the following reasons:
1. Pornography is not an acute event that requires an immediate response. Although pornography use has increased over time, the rise has been steady, even with the advent of the Internet.2 As such, there does not appear to be an acute event or tipping point that would require immediate response.
2. Pornography does not directly or imminently lead to death, infectious disease morbidity, property destruction, or population displacement. Research suggests that there may be adverse health consequences of pornography use for some, no substantial consequences for the majority, and positive effects for others.3,4 For example, for the minority predisposed to perpetrate sexual violence, viewing violent pornography may exacerbate risk.3 Additionally, individuals who frequently view pornography portraying risk behaviors (e.g., condomless sex) maybe more likely to engage in them.3 Research on how pornography affects the cohesion and fidelity of relationships and sexual satisfaction is mixed, but the majority of users do not experience substantial problems.3 6 Importantly, death, infection, property destruction, and population displacement are not resulting from pornography use. And for some, pornography use is associated with health-promoting behaviors, including increased intimacy, "safer" sexual behaviors (e.g., solo masturbation), and feelings of t 3,4,7 acceptance.
3.Pornography does not overwhelm the capacity of local systems to do the job of maintaining a community's health. There are multiple resources within communities across the United States for individuals who believe they are negatively affected by pornography, including therapy. Our systems are not overwhelmed.
WHAT'S THE HARM?
Calling something a "public health crisis" when it is not demonstrably so may result in unwarranted policy or funding shifts. For example, government agencies may spend money to convene experts for high-level meetings or require businesses and individuals to comply with unwarranted regulations. Moreover, pathologizing any form of sexual behavior, including pornography use, has the potential to restrict sexual freedom and to stigmatize, which is antithetical to public health. If the public health workforce wants to save its power to mobilize people when an acute threat is imminent, reserving the phrase "public health crisis" for strategic, select times is advisable.
PORNOGRAPHY FROM A PUBLIC HEALTH PERSPECTIVE
Although pornography is not a crisis, public health has much to offer an ongoing analysis of pornography's impact on health. The Centers for Disease Control and Prevention outlines a fourstep process to approach any public health problem: (1) define and monitor the problem, (2) identify risk and protective factors, (3) develop and test prevention strategies, and (4) ensure widespread adoption of developed strategies. Pornography is an exposure of interest, not an outcome. Under this framework, the first step would be to determine the health outcome of interest, to consider the full constellation of risk and protective factors related to that outcome, and weigh pornography's role in relation to the others.
Bronfenbrenner's (1979) social-ecological model may also prove useful. Considering pornography as one of many exposures that can influence outcomes across multiple levels of the social-ecology and developing interventions accordingly has higher odds of success than the overly simplistic approach of declaring pornography a crisis and promoting its abolishment or limited access.
Harm reduction is also worth considering. The idea that people could be motivated to use less pornography-or less

extreme pornography, and less frequently-is a harm reduction goal. Interventions seeking to increase pornography literacy, as opposed to trying to stop individuals from all use, could also be useful.

CONCLUSIONS

Although research suggests that pornography use likely influences some people negatively, and it merits further research, pornography itself is not a crisis. The movement to declare pornography a public health crisis is rooted in an ideology that is antithetical to many core values of public health promotion and is a political stunt, not reflective of best available evidence. ÂfPU

Kimberly M. Nelson, PhD, MPH
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CONTRIBUTORS

K. M. Nelson and E. F. Rothman contributed to the conceptualization, writing, and editing of this editorial. K. M. Nelson wrote the first draft and coordinated editing.

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CONFLICTS OF INTEREST

The authors have no conflicts of interest to declare.

Sidebar

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A Tobacco Control Framework for Regulating Public Consumption of Cannabis: Multistate Analysis and Policy Implications

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ABSTRACT (ENGLISH)

Eleven US states and Washington, DC, legalized recreational (adult use) cannabis. Seven states -Alaska, California, Colorado, Massachusetts, Nevada, Oregon, and Washington-allow cannabis sales. A public health concern is that exemptions in state or local smoke-free laws for public cannabis smoking or vaping will weaken smoke-free laws, expose the public to secondhand cannabis, and renormalize smoking. We describe the experience of the seven states and challenges faced in maintaining smokefree laws. Using elements of a tobacco control framework, we identify best practices in cannabis regulation by comparing each state's smoke-free laws and allowances for public cannabis use. All states prohibit public cannabis use;two lack 100% smoke-free protections; one lacks vaping devices in its smoke-free law; three allow cannabis use in retailers; two allow cannabis use in social consumption lounges; and two allow cannabis use in tourism venues. States should close gaps in smoke-free laws and not expand where cannabis use is permitted to ensure public health. (Am J Public Health. 2020;110:203-208. doi:10.2105/AJPH.2019.305423)

FULL TEXT

Headnote

Eleven US states and Washington, DC, legalized recreational (adult use) cannabis. Seven states -Alaska, California, Colorado, Massachusetts, Nevada, Oregon, and Washington-allow cannabis sales. A public health concern is that exemptions in state or local smoke-free laws for public cannabis smoking or vaping will weaken smoke-free laws, expose the public to secondhand cannabis, and renormalize smoking.

We describe the experience of the seven states and challenges faced in maintaining smokefree laws. Using elements of a tobacco control framework, we identify best practices in cannabis regulation by comparing each state's smoke-free laws and allowances for public cannabis use. All states prohibit public cannabis use; two lack 100% smoke-free protections; one lacks vaping devices in its smoke-free law; three allow cannabis use in retailers; two allow cannabis use in social consumption lounges; and two allow cannabis use in tourism venues.

States should close gaps in smoke-free laws and not expand where cannabis use is permitted to ensure public health. (Am J Public Health. 2020;110:203-208. doi:10.2105/AJPH.2019.305423)

More than one half of US states legalized cannabis for medical or adult (recreational) use among adults, although cannabis remains illegal under federal law.1 Between 2012 and 2019, 11 states, Guam, and Washington, DC, legalized adult cannabis use for individuals aged 21 years and older (Appendix, available as a supplement to the

online version of this article at http://www.ajph.org). Seven states-Alaska, California, Colorado, Massachusetts, Nevada, Oregon, and Washington-created a legal retail marketplace where cannabis is sold in specialty retail stores.2 8 A key regulatory challenge for cannabis-legal states and municipalities is establishing where residents can legally smoke cannabis or consume aerosolized (i.e., vaporized or "vaped") cannabis. Public cannabis consumption often conflicts with state smoke-free air laws that prohibit smoking and federal and state laws that prohibit cannabis use in shared air spaces (e.g., workplaces, public places, and multiunit housing).9,10

Among states that have legalized medical cannabis, adult cannabis, or both, its allowable use is generally confined to private property or outside of the view or smell of the public. Landlords of private (nonpublic) multiunit housing can also prohibit medically prescribed or adult use of cannabis, in addition to tobacco product use, on their property.11,12 Ballot measures have been drafted in a few cannabis-legal states that delegate authority to local jurisdictions to create exceptions to their smoke-free indoor air laws to expand where cannabis can be smoked or vaped (e.g., cannabis retail settings and tourism venues).

PUBLIC HEALTH CONCERNS

Public health officials are concerned that creating allowances for cannabis smoking or vaping in public settings can expose noncannabis users to secondhand cannabis byproducts and renormalize smoking behaviors among youths and the public.13 While the science of secondhand cannabis smoke (SHCS) exposure is emerging, exposure to SHCS impairs cardiovascular function.14,15 SHCS also contains many of the same carcinogenic compounds as tobacco smoke,16 and nonusers exposed to SHCS have shown measurable tetrahydrocannabinol (THC) concentrations in their blood serum and urine.17 In addition, vaporizing cannabis creates high concentrations of particulates that are hazardous to human health independent of smoking.18

There is also a public perception-particularly among youths-that cannabis smoke is less harmful and more socially acceptable than tobacco,19 with fewer perceived negative consequences than for alcohol.20 However, lessened perceived risks of cannabis-related harms may result in earlier age of use, greater frequency of use, and reduced motivation to cease or reduce use.21 In addition, chronic cannabis use, particularly in adolescence, is associated with deficits in cognitive functioning and brain development,22 psychoses, schizophrenia,23 and increased risks of motor vehicle accidents.24

Popular cannabis delivery methods that combine cannabis and tobacco (e.g., blunts) and devices that can be used for both cannabis and tobacco products such as electronic vaporizers are also a concern. Among youth e-cigarette users aged 12 to 17 years, the odds of past or current cannabis use were found to be 3.5 times higher than for non-e-cigarette users.25 A higher prevalence of tobacco-cannabis co-use has also been found in states that legalized medical cannabis, despite a lower cigarette use prevalence.26 These products may also renormalize tobacco use among young people, after decades of established 27,28 antismoking norms.

ALLOWANCES FOR PUBLIC CANNABIS CONSUMPTION

See Appendix (available as a supplement to the online version of this article at http://www.ajph. org) for a detailed discussion of methods. Table 1 provides a summary of all seven states' smoke-free laws, allowable exemptions, and locations where cannabis smoking or vaping is prohibited and authorized, as of August 2019.

Comprehensive Smoke-Free Laws

The American Nonsmokers' Rights Foundation defines a state as meeting 100% smoke-free criteria if the type of establishment (e.g., a public and nonhospitality workplace, restaurant, bar, and gambling establishment) prohibits smoking or use of e-cigarettes and other nicotine vaping devices in all indoor areas.29,30 Alaska requires workplaces, restaurants, bars, and gambling venues to be smokefree, but also allows municipalities to opt out ofstate smoke-free laws if approved by a local jurisdiction.31 California, Colorado, Massachusetts, Oregon, and Washington require all of these locations to be smoke-free, whereas Nevada exempts bars and gambling venues from the smoke-free law.32-37 Each state allows private or membershiponly tobacco clubs that meet specific state regulations. Massachusetts, Oregon, and Washington exempt private clubs from their smoke-free laws; smoking tobacco is allowed in private clubs without employees and that are not open to the public. There are currently no legal private cannabis-use establishments.

California, Colorado, Massachusetts, Oregon, and Washington designate 20% to 25% of hotel, motel, or other lodging establishments where tobacco and cannabis smoking or vaping is exempt from those states' smoke-free laws, unless prohibited by an individual business policy or local law.30 Similarly, while Alaska and Nevada exempt all hotels from the state smokefree law, an individual business policy or local law can prohibit smoking or vaping. Except for Washington, the remaining six states exempt tobacco or vape shops from their smoke-free law. All states except Nevada include electronic vaping products in their state smoke-free law.

Prohibition of Public Cannabis Use

For purposes of this analysis, public cannabis smoking or vaping refers only to indoor cannabis smoking or vaping where tobacco smoking is prohibited. In other cases, cannabis use is prohibited even where tobacco use is allowed. For example, Nevada state law prohibits cannabis use in bars and gambling establishments, while tobacco smoking is allowed.

Prohibition of Cannabis Use in Businesses

State and local cannabis regulations cover three broad categories of commercial venues: cannabis retail establishments (dispensaries), cannabis consumption lounges, and cannabis tourism venues such as public events and cannabis tour buses.

Cannabis retail establishments. Alaska, California, and Colorado allow cannabis smoking or vaping on the premises ofa cannabis retail establishment, per local approval. In October 2018, Alaska adopted a statewide smoke-free workplaces law prohibiting the use of cannabis and electronic vaping products in indoor workplaces, which included an exemption to allow cannabis use in cannabis retail establishments, per approval by the state's Marijuana Control Board.38 In December 2018, the board adopted an on-site consumption endorsement, allowing cannabis indoor smoking, vaping, and consuming edibles in retail establishments if approved by a local jurisdiction.39 In March 2019, the endorsement was signed by the governor. The adopted rules require a standalone cannabis retailer building. Retailers are required to create a ventilated indoor lounge separate from the main retail space and install a door between the retail space and the on-site smoking consumption area.40 Retailers are also required to create a smoke-free area for employees to monitor the consumption area. The area can be outdoors if it is out of sight from the public, away from neighboring air intake vents for other buildings, and there are no objections from neighboring property owners.

California delegates authority to local jurisdictions to regulate on-site cannabis consumption in retail establishments for cannabis retailers and microbusinesses (a business that provides a combination of cultivation, manufacturing, distribution, or retail).41 A local jurisdiction can permit cannabis smoking or vaping in a licensed cannabis business if access is restricted to adults aged 21 years and older, use is not visible to the public, and alcohol and tobacco consumption are prohibited. A small number of California cities have developed regulations to allow on-site smoking or vaping of cannabis in cannabis retailers.42

In May 2019, Colorado passed a state law to allow cannabis retail establishments to apply for cannabis consumption licenses. Starting in January 2020, indoor cannabis smoking and vaping among adults aged 21 years and older will be allowed in licensed cannabis retailers.43 In September 2019, the Massachusetts Cannabis Control Commission authorized a pilot program for on-site consumption in cannabis retailers and is awaiting state legislative 44 approval. While cannabis consumption in retail establishments is not currently legal in Nevada, a provision in the state's ballot measure allows the state to authorize a local jurisdiction to permit cannabis consumption at a retailer.45 In May 2019, the governor signed a bill into law prohibiting a local jurisdiction from licensing a business that allows cannabis consumption on its premises until 2021.46 The law also establishes the Cannabis Compliance Board to conduct a study relating to such businesses. Washington and Oregon currently do not allow on-site consumption in cannabis retail establishments.47,48

Cannabis consumption lounges. Also referred to as cannabis social use venues, these are indoor businesses where customers can legally smoke, vape, or ingest cannabis. Alaska has not licensed any consumption lounges yet. California allows local jurisdictions the option to approve cannabis lounges if the business does not sell cannabis and is attached to a licensed cannabis retailer. Alcohol or tobacco consumption is prohibited in lounges, and

cannabis consumption is allowable if it is not visible from a public place or non-age-restricted area. A small number of California cities currently allow consumption in lounges. In February 2019, a state bill was introduced to create a regulatory structure to license cannabis consumption lounges.49

Colorado's 2019 law will also allow restaurants, hotels, and other businesses to apply for cannabis consumption licenses, where indoor cannabis smoking and vaping are allowed. The law contains an allowable exemption from Colorado's Clean Indoor Air Act, a state law that bans public indoor smoking. Cannabis would be sold, but alcohol could not be served. Local jurisdictions would have to opt in to the new licensing program and could prohibit certain forms of consumption, such as indoor smok50 ing or vaping.

In 2019, Oregon introduced a bill to create an exemption to the state's clean indoor air laws to allow cannabis smoking or vaping in enclosed areas such as licensed cannabis lounges, but the bill did not pass.51 Consumption lounges are not currently allowed in Alaska; future plans call for issuing permits for consumption lounges attached to a cannabis retail establishment. Massachusetts has proposed a pilot cannabis consumption lounge in Boston and is awaiting state approval.52 Nevada prohibits cannabis consumption licensing until 2021, and Washington and Oregon currently prohibit cannabis consumption lounges.

Cannabis tourism. Cannabis tourism is a rapidly growing industry. Most states where cannabis can be purchased offer cannabis bus tours that take customers to and from cannabis retail establishments. As part of the tour, some businesses allow passengers to smoke or vape what they purchased at a cannabis retail establishment, which is often in violation of a state's clean indoor air laws. Colorado's 2019 law includes a provision for tourbuses or limousines to apply for cannabis consumption licenses. Per local approval, cannabis could be smoked or vaped on the bus but not be sold. In February 2019, a California bill was introduced allowing passengers aged 21 years and older to smoke or vape cannabis products on cannabis tour buses or limousines if the driver's compartment is sealed off by a physical barrier and has separate ventilation systems for the driver and passenger.53 The California Highway Patrol would be the agency responsible for providing oversight of the vehicle. Opponents of the bill stated concerns about the efficacy of sealing the driver from exposure to the remainder of the coach, concerns about inhalation of SHCS or aerosol, and attendant risks to driver and passenger safety.

Other popular cannabis tourist attractions are fairs and music festivals. Although most of these events occur outdoors, there are indoor locations (e.g., closed tents, indoor sales demonstrations) where smoking or vaping cannabis may be allowed. California issues temporary licenses for these activities to allow onsite cannabis sales and consumption for adults aged 21 years and older. Like the regulations for on-site consumption in cannabis retail settings, access to the consumption area at fairs or festivals is restricted to adults, use must be out of view of the public, and sales or consumption of alcohol are prohibited. In 2018, California passed a law expanding the places where cannabis events can be held. A vendor can apply for a temporary event license to hold a cannabis event in any local jurisdiction in California if the jurisdiction authorizes the event and does not already have an ordinance prohibiting the use of tobacco products at that location.54

In 2017, Nevada passed a bill with which a local jurisdiction can allow a business to hold a special public event with cannabis consumption.55 Alaska, Colorado, Massachusetts, Oregon, and Washington do not allow public cannabis use at public events, yet companies in these states offer their own versions of cannabis events that may not be legally sanctioned, such as "4/20 Day"; "Cannabis Cup"; "Puff, Pass, Paint"; and other events during which groups of people smoke or vape cannabis together in public settings. An important consideration is if these events are held indoors, where secondhand cannabis or aerosol exposure would be of concern and clean indoor air protections may be violated. These activities are listed on cannabis-oriented tourism Web sites.56

ONGOING CHALLENGES

Cannabis legalization continues to expand throughout the United States. States and local jurisdictions are grappling with how to find places for residents to consume cannabis legally without violating smoke-free air laws and compromising the public's health. There are also important social equity concerns with cannabis legalization. Cannabis consumers that live in rental properties or government housing that bans federally illegal substances may risk fines or eviction for consuming cannabis. These are often the same impoverished communities that have been

negatively impacted by US drug laws.

Our analysis documents a growing trend for states and localities to allow exceptions for indoor public cannabis use in venues that are currently required to be smoke-free. For example, while only two states allow cannabis consumption lounges at the time of this writing (California and Colorado), three additional states-Alaska, Massachusetts, and Nevada-have developed future plans for cannabis consumption lounges. A concern is that allowances for on-site cannabis consumption may roll back existing smokefree protections that prevent the public's exposure to secondhand smoke and aerosols.

On-site cannabis consumption may also violate employee protections concerning smoking in workplace environments, such as tourist buses, retail establishments, and lounges where workers serve customers.57 In addition, the practice of installing barriers or ventilation systems to prevent or remove SHCS or aerosols does not eliminate the health hazards of exposure to these constituents; the only way to eliminate health risks is with a completely smoke-free environment.58,59

RECOMMENDATIONS

Currently, all states where cannabis is legal prohibit its use in public indoor settings. One option is to amend language regarding prohibition on outdoor cannabis use while retaining strong smoke-free indoor air rules. Consideration could be made for stand-alone buildings to allow sampling or use in an outside area where workers and patrons would not be exposed to secondhand cannabis constituents. This would also necessitate education of law enforcement officials to prevent discriminatory enforcement.

While it is unknown if cannabis normalization leads to increased cannabis use among youths, the rapid expansion of poly product use among young people (e.g., tobacco, e-cigarettes, and cannabis) makes it imperative that local and state policies denormalize all forms of smoking and vaping to limit the negative health impacts of use and exposure to secondhand cannabis constituents. The recent national outbreak of vaping-related lung injury among youths and young adults increases this urgency.60 By limiting where cannabis can be consumed, public consumption laws can decrease youths' exposure to cannabis, which may reduce its social acceptability and serve as a barrier to initiation.61 Public health officials play a critical role to ensure strong policies are developed that reduce community exposure to secondhand byproducts and maximize public health.

CONTRIBUTORS

J. Steinberg provided overall conceptualization and management of the article, including overseeing methods used to produce the article. She also conducted data collection and analyzed the data, conducted the literature review, and managed all aspects of the article writing process, including coordinating assignments and review by co-authors and collaborators and reviewing and approving all drafts and final submission. J. B. Unger provided assistance with methods (e.g., conceptual framework) and the literature review. She also provided input and edited the methods section in the Appendix and provided review of all drafts and final submission. C. Hallett provided updated information on statewide and local tobacco control and cannabis laws and policies and assisted with the Recommendations section of the article, as well as assisted in responses to reviewer comments. E. Williams also provided updated information on statewide and local tobacco policies as well as assisted in responses to reviewer comments. L. Baezconde- Garbanati provided edits on drafts and final and revised submissions. M.R. Cousineau provided detailed edits on drafts and final and revised submissions and provided assistance on updated statewide policies.

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CONFLICTS OF INTEREST

The authors have no financial relationships relevant to this article to disclose.

Sidebar

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DETAILS

Subject:	Cannabis; Smoking; Legislation; Smoke; Public health; Tobacco; Recreational use; Gambling; Consumption; Electronic cigarettes; Tourism; Marijuana; Onsite; Referendums; Lounges; Drug abuse; Medical marijuana; Jurisdiction; Law; Sales; Tobacco smoke; Adults; Vaping; Retail stores; States; Multiple dwellings
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Database:	Public Health Database

Methods of Tracking Newborns: New York State Zika Pregnancy and Infant Registry, 2015–2017

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ProQuest document link

ABSTRACT (ENGLISH)

Objectives. To describe methods employed to track infants enrolled in the New York State Zika Pregnancy and Infant Registry (NYSZPIR) and demonstrate the benefits of population databases to improve the process. Methods. We used patient medical records and provider outreach, New York State Immunization Information System (NYSIIS), and New York State Early Hearing Detection and Intervention Information System (NYEHDI-IS) to gather medical information. We used descriptive statistics to summarize variables and the McNemar test to determine statistical significance (P< .05). Results. We identified 109 live births from NYSZPIR mothers. Provider information was documented for 106 (97.2%) infants in NYSIIS compared with 72 (66.1%) through chart review. Collected results of newborn hearing screening increased from 82 (75.2%) to 106 (97.2%) using NYEHDI-IS. The amount of data obtained was significantly higher (P< .001) when including NYSIIS and NYEHDI-IS compared with using medical records alone. Conclusions. Public health surveillance systems can be used to track infants using data sources such as NYSIIS and NYEHDI-IS in addition to traditional methods. Using medical records alone is inadequate for locating and tracking infants and may result in high lost to follow-up rates. (Am J Public Health. 2020;110:216-221. doi:1 0.2105/ AJPH.2019.305406)

FULL TEXT

Headnote

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In 2015, the World Health Organization declared a public health emergency of international concern in the Americas in response to a cluster of microcephaly cases associated with Zika virus (ZIKV) infection during pregnancy.1 ZIKV is spread mostly through the bite of an infected Aedes species mosquito (Aedes aegypti, Aedes albopictus) as well as from one person to another through sexual contact.2 Although the virus is known to cause mild illness in adults occasionally, ZIKV has the potential to cause congenital microcephaly, brain abnormalities, ocular dysfunction, difficulties in swallowing, and other serious defects in fetuses and infants.3,4 However, the spectrum of health outcomes associated with congenital ZIKV infection is not fully defined.5 Follow-up of infants who were potentially exposed to ZIKV in utero is essential for understanding the full magnitude of risks associated with congenital ZIKV infection and for planning the clinical care and intervention services needed for affected infants.6
In 2016, New York State Department of Health (NYSDOH) established a Zika Pregnancy and Infant Registry (ZPIR) as part of a national effort to monitor and collect follow-up information on all pregnant women with laboratory evidence of possible ZIKV infection and their infants. The NYSDOH works collaboratively with the Centers for Disease Control and Prevention (CDC) to determine methods for collecting enhanced surveillance data. Collected information includes details of the pregnancy, exposure, travel, and birth history. We also requested findings from physical, developmental, imaging, and laboratory assessments performed during clinical care ofthe infant at birth and at 2, 6,12, and 18 months. We describe methods used to collect enhanced surveillance data on infants enrolled in ZPIR and demonstrate the potential benefits of using population databases to improve the system of tracking infants.

METHODS

This cohort study consisted of all completed pregnancies with maternal, fetal, or infant laboratory evidence of possible ZIKV infection from July 2015 through December 2017, reported to the ZPIR in NYS excluding New York City (NYC). The ZPIR defines laboratory evidence ofpossible recent ZIKV infection as (1) presence of Zika virus RNA on the real-time reverse transcription- polymerase chain reaction test or other nucleic acid amplification test, or (2) maternal serological evidence of a recent ZIKV infection based on a positive or equivocal result on the Zika virus IgM (Immunoglobulin M) antibody capture enzyme-linked immunosorbent assay with a confirmatory plaquereduction neutralization test.7 We included only completed pregnancies with live-born infants. We excluded pregnancies that ended in spontaneous abortion, termination of pregnancy, or stillbirth.

Data Sources

New York State Immunization Information System. NYS Immunization Information System (NYSIIS) is a population-based web application used to track immunization information of NYS residents outside NYC.
Public health law in NYS requires that vaccines administered to children younger than 19 years must be entered into NYSIIS within 14 days of administration.8 Through NYSIIS, obtained data included demographic information, immunization records, dates of service, and contact information of providers who administered vaccines to infants. Many ofthe listed variables are prepopulated as part of the vital records birth certificate feed to NYSIIS.

Immunization administered at birth and vital record birth certificate information are loaded weekly into NYSIIS.
New York State Early Hearing Detection and Intervention Information System. The NYS Early Hearing Detection and Intervention Information System (NYEHDI-IS) is a statewide database containing NYS newborns' initial hearing screening data, follow-up audiological evaluation testing results, and early intervention service recommendations. NYS public health law requires all maternity hospitals and birthing centers to administer newborn hearing screening programs shortly after birth. It takes approximately 7 to 14 days from the infant's birth for the birth record information to be viewable in NYEHDI-IS.9 Collected data included date of test, method used, hearing screening, and follow-up results, as well as the location of the screening.
Patient medical records. We abstracted maternal-infant pairs delivery records and infant outpatient records. Collected variables included date of birth, sex, gestational age, height, weight, abnormal findings, hearing screening results, imaging results, Apgar score, and admission to a neonatal intensive care unit. The Apgar score, a tool used to assess well-being at 1 and 5 minutes after birth, incorporates 5 elements: respiratory effort, heart rate, reflex irritability, muscle tone, and color.10
Provider outreach. We contacted birthing facilities and obstetrics and gynecology providers by telephone to gather newborn date of birth and infant assessment at birth, including information such as weight, length, head circumference, and all identified birth abnormalities. We defined health care providers as anyone involved in patient care, including primary care, obstetrics and gynecology physicians or other specialty physicians, and nonphysicians, which could include nurse practitioners, physician assistants, and other clinicians. We contacted all health care providers identified through NYSIIS by telephone to confirm that patients were receiving care at the identified facilities. Data obtained included infants' current state ofhealth, growth, and development, physical exam and neurologic evaluation, neurologic imaging studies, congenital anomalies of the eye, and referrals to any specialty services or care. We faxed a letter to each provider that included Zika testing and head ultrasound recommendations for all infants in accordance with NYSDOH and CDC current guidelines before the expected delivery date and again to pediatricians before an infant's 2-month follow-up appointment.
Infant FoLLow-Up
After the baby was born, we requested all delivery records for maternal-infant pairs and all infant outpatient records, and we extracted clinical and demographic data. As a first step to infant follow-up in the outpatient setting, we used NYSIIS to identify or verify infants' legal first and last names and pediatricians' contacts. As there was no unique identifier available among the data sources, we used personal identifiers such as mother's first, middle, and last names; newborn's date of birth; and gender as common identifiers in matching databases and medical records deterministically. All the infants were followed prospectively at age 2, 6, 12, and 18 months.
Data Analysis
The analysis included all data collected up to December 31, 2017. Head circumference percentile at birth was calculated by the INTERGROWTH 21st tool to identify cases with congenital microcephaly.11 The CDC defined congenital microcephaly as a head circumference ofless than 3 SD from the mean for gestational age and sex, according to INTERGROWTH 21st standards.12 We compared the completeness of extracted data from infants' medical records alone with the data collected through NYSIIS, NYEHDI-IS, and provider interviews collectively. We used descriptive statistics, including frequencies and proportions, to summarize variables. We conducted the McNemar test to determine whether the differences in the proportion ofdata obtained from medical records and obtained from other data sources were significant, with a P value of less than .05 considered statistically significant. We analyzed data with the use of SAS version 9.4 (SAS Institute, Cary, NC).
RESULTS
We identified 120 pregnant women with laboratory evidence of possible ZIKV infection during July 2015 through December 2017 in NYS. Among the 120 pregnancies, outcomes were recorded for 115 (95.8%) pregnancies, including 109 (90.8%) live-born infants, 1 (0.8%) deceased neonate, and 5 (4.2%) pregnancy losses. ZIKV testing was completed for 78 (70.9%) infants, and 32 (29.1%) infants, including the deceased neonate, had no evidence of laboratory testing (Table 1). The reason for not testing was not provided. The median age of the sample at analysis

was 12.1 months (range = 3 weeks- 29 months); 5 (4.6%) infants were younger than 2 months, 17 (15.6%) infants were between 2 and 6 months, 34 (31.2%) infants were older than 6 months and no older than 12 months, and 53 (48.6%) infants were older than 12 months (Table 1).

For the 109 infants identified, 7 (6.4%) infants were born with 1 or more birth defects; 4 (3.7%) infants had head circumference measurements more than 3 SDs below the mean for their age and sex, and another 3 (2.8%) infants had congenital heart defects (Table 1). We examined the birth defect conditions recorded in medical charts and compared them with the CDC list of Zika-associated birth defect conditions. We identified 4 (3.7%) infants with congenital microcephaly in accordance with CDC inclusion criteria. The 4 infants had no other Zika-associated birth defects identified during follow-up care. Only 2 (1.9%) infants detected at birth had the actual diagnosis on medical records. The other 2 infants never received a medical diagnosis of congenital microcephaly. Through provider interview, approximately 1 of 4 pediatricians in the outpatient setting did not know about the infant's exposure to ZIKV.

Medical records were the best sources for birth variables, comorbidities, congenital anomalies, and hospitalization data. Although delivery records had accurate and complete documentation of many of the variables, infant's legal name, provider's contacts, and hearing screening results were only partially documented (Table 2). After using other sources such as NYSIIS and NYEHDI-IS, the amount of data obtained was significantly higher ($P < .001$) than the amount of data obtained from using medical records alone. We identified first and last legal names of all 109 (100%) live-birth infants through NYSIIS compared with only 57 (52.3%) infants through delivery records extraction. We found pediatrician contact information in NYSIIS recorded for 106 (97.2%) infants. We verified pediatricians' contact information through telephone calls to the provider. On chart review, 72 (66.1%) infants had documented provider contacts, and only 39 (35.8%) infants were seen by the pediatrician identified by their medical records at birth.

Newborn hearing screening results were comprehensively documented through NYEHDI-IS. Completeness of collected results increased from 82 (75.2%) to 106 (97.2%) after obtaining data through NYEHDI-IS compared with medical record extractions alone (Table 3). For pediatrician contact information and hearing screening, all infants identified in the medical records were identified in NYSIIS and NYEHDI-IS.

DISCUSSION

Local health departments in NYS increasingly rely on laboratory reports from the Electronic Clinical Laboratory Reporting System to rapidly identify pregnant women and infants eligible for ZPIR in accordance with CDC guidelines. However, continuing follow-up is challenging, as provider information on delivery records may be inaccurate or become outdated. In recent years, the availability and potential use of various new and nontraditional sources of data to improve public health surveillance and evaluation have increased. These include population-based web applications and states' public health systems, which provide opportunities for surveillance and data evaluation.13,14 The NYSDOH experience in tracking infants identified by ZPIR shows that it is feasible to use the existing public health surveillance systems using data sources, such as NYSIIS and NYEHDI-IS, in addition to traditional methods, such as abstracting medical records and provider interview.

Outpatient follow-up is generally recommended within 2 days after discharge from a birthing hospital for neonates.15 However, referral ofinfants to pediatricians or other primary care providers after discharge varies by state, which negatively affects the ability to identify the outpatient pediatrician and to follow up the infant. NYSIIS improved the ability to identify birthing hospitals and outpatient pediatricians through immediate access to immunization records of the infants and thus reduced the number of patients lost to follow-up in the cohort study. In 2017, approximately 93% of children born and residing in NYS outside NYC had a record established in the NYSIIS within 30 days of birth. For the same year, 52% of administered vaccines were reported within 1 day.16

Because of mandatory reporting by providers in NYS, tracking immunization records through NYSIIS enabled identification of an infant's birthing facility by 7 days and identifying the outpatient pediatrician by age 1 month. This approach enabled rapid collection of clinical data elements, which is essential for estimating disease burden, monitoring disease trends, developing robust clinical guidelines, and evaluating the impact of prevention programs.17 About 95% of all the children in the United States, excluding territories, were enrolled in immunization

information systems (IISs) with 2 or more immunizations recorded in 2017.18 In the event of future disease outbreaks, statewide IISs will assist state and local health departments in tracking children in need of follow-up and identifying their pediatricians.

As ofDecember 19,2017,2143 completed pregnancies for women with laboratory evidence of possible ZIKV infection were reported to the ZPIR in the United States and the District of Columbia. ZIKV-associated birth defects were reported in 102 live-born infants, including microcephaly, hearing loss, and other defects.19 Our research expands on the CDC's initial findings by demonstrating that direct follow-up resulted in identification and detection of both congenital anomalies and those that developed after birth in time for early intervention. Our data show that 2 infants, who have been identified as microcephalic in accordance with CDC criteria, never received a medical diagnosis of microcephaly at birth. All identified infants with microcephaly in our cohort had an actual record of postnatal measurements with head circumference below the third percentile for the infant's sex and age. However, congenital microcephaly may have gone undetected at the birthing hospital because of the inconsistent case definition of microcephaly used in clinical medicine.20 Furthermore, we observed insufficient communication among pre- and postnatal providers, pediatricians, and other specialists, which raises concerns about fragmentation of care.

Children born with microcephaly or other congenital anomalies associated with Zika require frequent examinations and diagnostic testing by an array of providers in a wide variety of subspecialties to monitor development as the child grows, resulting in scattered medical records. It is critical that pediatricians continue to stay up-to-date on evaluation, diagnosis, and clinical management decisions to ensure optimal identification and continuity of care of affected infants and children.21 The ZPIR team in NYS used the pediatrician contact information obtained through NYSIIS to track the infants and fill this system gap. Pediatricians in charge of the children were contacted, notified about Zika exposure, and provided with information such as testing recommendations and guidance on how to manage the child's conditions in a timely manner.

Zika outcomes for infants in other jurisdictions and states were collected through clinical evaluations, caregiver interviews, and review of medical records.12,22 These traditional methods can be limiting because oflow data completion rates and timeliness.23 Relying on paper records and telephone calls make it increasingly difficult to follow up the infants and trace those who do not return to the same clinic or provider. According to the CDC, more than 20% of the children in the United States typically have seen more than 1 health care provider by 2 years of age.24 NYSIIS enabled quick access to infants' immunization records for more coordinated and efficient care and public health response. Recent findings on Zika in children born in US territories have indicated that abnormalities may develop or be detected postnatally, despite a child appearing normal at birth, emphasizing the importance of continued monitoring.12 Future efforts need to include a sustainable approach of care coordination between pre- and postnatal clinics, birthing hospital, and outpatient pediatrician clinics.

Limitations

Although this approach is recommended for surveillance systems related to pediatrics or communicable diseases with public health significance, several limitations should be noted. NYS public health laws authorize access for immunization records for state and local health departments, health care providers, hospitals, the Office of Children and Family Services, and certified home health agencies. The methods described can be similarly used by other jurisdictions to assist during disease outbreaks or public health emergencies or to identify pediatric patients in need of public health services.

IISs are operational in 55 jurisdictions in 49 states and 6 cities in the United States.25 However, exchange of immunization information within and across states varies because of diverse regulatory policies. Confidentiality requirements may limit access to records across IIS jurisdictions or entities. Other states wishing to implement a similar system should determine the regulatory difference for the exchange and use of immunization data and health information. We did not evaluate the possible restrictions facedby other states or jurisdictions.

We relied on documentation and verbal reports of health outcomes potentially attributable to ZIKV in infants, which has potential for reporting bias and inaccuracies. Last, an infant's record may not be found in NYSIIS or NYEHDI-IS for the following reasons: delay in the electronic birth certificate's data entry, outof-state infants (no record), home

births (delay in receiving records), name changes, misspellings, and other similar reasons. Limited information was available on infants lost to follow-up and their current status. A future study may investigate the reasons an infant may become lost to follow-up.

Public Health Implications

Medical records alone are inadequate for locating and tracking infants and may result in high lost to follow-up rates. We have shown that it is feasible to use the existing public health surveillance systems using data sources, such as NYSIIS and NYEHDI-IS, in addition to using traditional methods. Use of the population-based databases for surveillance can be a valuable resource in supporting data collection of public health outcomes, including ascertainment of primary care physicians, medical visit completion, and screening rates for children. In the event of a future disease outbreaks, statewide IISs could help facilitate early detection of disease outcomes as well as evaluation of the quality of health services and clinical treatment on quality of life. A]P4

CONTRIBUTORS

Z.S. Alaali collected the infants' medical data and drafted the article. Z. S. Alaali and N. D. Longcore cleaned and analyzed the data. Z.S. Alaali, N.D. Longcore, P. Santos, and V. H. Glaze reviewed and revised the article. Z. S. Alaali and N. Ahmad conceptualized and designed the study. N.D. Longcore coordinated data collection. P. Santos and V. H. Glaze collected medical information of eligible pregnant women and mother-infant pairs testing data. N. Ahmad supervised data collection and critically reviewed the article for important intellectual content. All authors approved the final article as submitted and agree to be accountable for all aspects of the work.

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Note. The article's contents are solely the responsibility ofthe authors and do not necessarily represent the official views of CDC.

CONFLICTS OF INTEREST

The authors declare no conflict of interest.

HUMAN PARTICIPANT PROTECTION

Institutional review board approval was not required for this article because public health surveillance activities are considered nonresearch operational activities.

Sidebar

ABOUT THE AUTHORS

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DETAILS

Subject:	Medical records; Birth defects; Neonates; Vaccines; Zika virus; Surveillance; Infants; Statistical tests; Pregnancy; Medical laboratories; Tracking; Immunization; Pediatrics; Intervention; Obstetrics; Public health; Hearing; Vector-borne diseases; Newborn babies; Medical screening; Disease control; Infections; Womens health; Microcephaly; Information systems; Statistical significance; Age; Gynecology; Surveillance systems; Statistics; Babies; Databases; Health surveillance; Gestational age; Apgar score; Maternal and infant welfare; Birth certificates; Viruses; Archives &records; Medicine; Tests; Information sources
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Bibliography

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Boone, Cheriko A,M.S.W., M.P.H., & Bowleg, Lisa,PhD., M.A. (2020). Structuring sexual pleasure: Equitable access to biomedical HIV prevention for black men who have sex with men. American Journal of Public Health, 110(2), 157-159. doi:https://doi.org/10.2105/AJPH.2019.305503

What comes to mind when you hear the words "Black men" and "sex"? If you answered "risk," "danger," or "HIV/AIDS," your response aligns with the primary finding of our critical review of social and behavioral science research on US Black men's sexualities. We analyzed 668 articles on Black men and sexuality before 1981 (before the HIV/AIDS epidemic) and between 2006 and 2016, and found that the vast majority (84%; n = 559) focused on sexual health and sexual risk (mostly HIV), and on Black gay, bisexual, and other men who have sex with men (GBMSM), a group disproportionately affected by HIV/AIDS. Research on sexual pleasure, by contrast, was virtually nonexistent for Black men regardless of sexual identity. With few exceptions- notable for their emphasis on love, satisfaction, affection, sexual intimacy, and pleasure- risk, danger, and deficit, not sexual pleasure, were the primary frame for Black GBMSM's sexualities and sexual health. For Black GBMSM, our focus, the implications of this negative emphasis are grave because it ignores possibilities for Black GBMSM to develop healthy, emotionally intimate, trusting, and sexually pleasurable relationships with partners regardless of HIV status. Sexual pleasure is inextricably linked to sexual health and sexual rights. Sexual health, according to the World Health Organization's (WHO's) definition, (p5) is... a state of physical, emotional, mental and social well-being in relation to sexuality . . . not merely the absence of disease, dysfunction or infirmity. Sexual health requires a positive and respectful approach to sexuality and sexual relationships as well as the possibility of having pleasurable and safe sexual experiences, free of coercion, discrimination, and violence. Contrasted with WHO's attention to sexual pleasure, conventional US public health approaches tend to emphasize problematic aspects of sexuality: sexually transmitted infections, unintended pregnancies, and sexual violence. Implicit in the title of the prevailing standard of sexual health in the United States, the 2001 US Surgeon General's Call to Action to Promote Sexual Health and Responsible Sexual Behavior (https://www.ncbi.nlm.nih. gov/pubmed/20669514), is the notion that morality (i.e., "Responsible") and individuals alone-not individuals in conjunction with social- structural context-shape sexual health. Public health discourses have historically conceptualized sexual pleasure primarily as an individual-level experience, something achieved alone or with others, rather than an experience structured by interpersonal practices, policies, and laws (e.g., discrimination, stigma). There are numerous examples of the latter. These include laws criminalizing certain sexual behaviors among consenting adults (e.g., sodomy before the 2003 US Supreme Court Lawrence v. Texas ruling); the lack of legal protections against discrimination for sexual and gender minorities (e.g., 26 states provide no explicit antidiscrimination protections for lesbian, gay, bisexual, and transgender people); laws that criminalize HIV-positive people's sexual expression regardless of HIV disclosure; and restrictions on insurance coverage for contraception (e.g., a 2017 executive order paved the way for federal rules-since overturned by courts-that would have exempted contraception coverage based on moral or religious objections). Inequitable access to biomedical HIV prevention methods represents another structural barrier to Black GBMSM's sexual pleasure.

Cicero, T. J., PhD., Ellis, M. S., M.P.E., & Kasper, Z. A., M.P.H. (2020). Polysubstance use: A broader understanding of substance use during the opioid crisis. American Journal of Public Health, 110(2), 244-250. doi:https://doi.org/10.2105/AJPH.2019.305412

Objectives. To understand important changes in co-occurring opioid and nonopioid drug use (i.e., polysubstance use) within the opioid epidemic in the United States. Methods. We analyzed survey data on the past month co-use of prescription and illicit opioids and 12 nonopioid psychoactive drug classes from a national sample of 15 741 persons entering treatment of opioid use disorder. Results. Past-month illicit opioid use increased from 44.8% in 2011 to 70.1% in 2018, while the use of prescription opioids alone dropped from 55.2% to 29.9%, yet overall remained high (94.5% to 85.2%). Past-month use of at least 1 nonopioid drug occurred in nearly all participants (>90%), with significant increases in methamphetamine (+85%) and decreases across nonopioid prescription drug classes (range: -40% to -68%). Conclusions. Viewing opioid trends in a "silo" ignores the fact not only that polysubstance

use is ubiquitous among those with opioid use disorder but also that significant changes in polysubstance use should be monitored alongside opioid trends. Public Health Implications. Treatment, prevention, and policymaking must address not only the supply and demand of a singular drug class but also the global nature of substance use overall. (Am J Public Health. 2020;1 10:244-250. doi:10.21 05/ AJPH.2019.305412)

Schinasi, L. H.,PhD.M.S.P.H., Bloch, J. R.,C.R.N.P.PhD., Melly, S.,M.S.M.A., Zhao, Y., M.S., & Moore, K., M.S. (2020). High ambient temperature and infant mortality in philadelphia, pennsylvania: A Case–Crossover study. American Journal of Public Health, 110(2), 189-195. doi:https://doi.org/10.2105/AJPH.2019.305442

Objective. To quantify the association between heat and infant mortality and identify factors that influence infant vulnerability to heat. Methods. We conducted a time-stratified case-crossover analysis of associations between ambient temperature and infant mortality in Philadelphia, Pennsylvania, during the warm months of 2000 through 2015. We used conditional logistic regression models to estimate associations of infant mortality with daily temperatures on the day of death (lag 0) and for averaging periods of 0 to 1 to 0 to 3 days before the day of death. We explored modification of associations by individual and census tract-level characteristics and by amounts of green space. Results. Risk of infant mortality increased by 22.4% (95% confidence interval CI] = 5.0%, 42.6%) for every 1°C increase in minimum daily temperature over 23.9°C on the day of death. We observed limited evidence of effect modification across strata of the covariates. Conclusions. Our results contribute to a growing body of evidence that infants are a subpopulation that is particularly vulnerable to climate change effects. Further research using large data sets is critically needed to elucidate modifiable factors that may protect infants against heat vulnerability. (Am J Public Health. 2020;110:189-195. doi:10.2105/ AJPH.2019.305442)

Nisson, P. L., M.D., Ley, E., M.D., & Chu, R., M.D. (2020). Electric scooters: Case reports indicate a growing public health concern. American Journal of Public Health, 110(2), 177-179. doi:https://doi.org/10.2105/AJPH.2019.305499

With the introduction of rideshare electric "dockless" scooters in 2017 by Bird Rides, Inc, a new type of affordable transportation became available to the public. Often seen along the sidewalks and street corners of downtown metropolitan areas, these devices are strategically designed for the heavily congested, urban population centers. Patrons download an application on their smartphone, enterbilling information, and then link the account to any available electric scooter. Although commercially available models exist with a top speed of 50 miles per hour and a range of 75 miles, electric scooters from Bird and Lime travel at a top speed of 15 miles per hour and have a range between 15 and 20 miles. On completion, the rider leaves the scooter along the sidewalk, where it waits for the next interested patron. Some of the appealing aspects of these devices include low cost, ease of accessibility, and the ability to bypass the often standstill traffic conditions by using the bike lanes, surface street, and sidewalk. Over the past two years, market demand has grown, with multiple companies (e.g., Bird, Lime, Spin, Uber, and Lyft) entering the industry. Electric scooters and their derivative will become a $42 billion industry by 2030. However, in parallel with their growing popularity has been an awareness of their safety hazards. Reports across the United States cite various types of injuries, from skin abrasions and ankle sprains to major injuries including open fractures, traumatic brain injuries, and even death.

11 years Ago/140 years ago (16 years in AJPH). (2020). American Journal of Public Health, 110(2), 133. Retrieved from https://www.proquest.com/scholarly-journals/11-years-ago-140-16-ajph/docview/2345794128/se-2?accountid=211160

Auerbach, J., M.B.A., & Lynn, J., M.D. (2020). Most americans face a grim old age-and disadvantaged groups have it worse. American Journal of Public Health, 110(2), 136-137. doi:https://doi.org/10.2105/AJPH.2019.305474

Golden Years? Social Inequality in Later Life by Deborah Carr is reviewed.

Subica, A. M., PhD., & Brown, B. J., PhD. (2020). Addressing health disparities through deliberative methods: Citizens' panels for health equity. American Journal of Public Health, 110(2), 166-173. doi:https://doi.org/10.2105/AJPH.2019.305450

Health disparities adversely affect millions of people living in disadvantaged communities, resisting public health interventions that do not address the specific conditions, driving forces, or health problems in these communities. Drawing from the underutilized science of deliberative methods, we introduce the innovative citizens' panels for health equity approach-a novel methodology that engages public expertise and knowledge of community health needs, risks, and priorities to tailor public health research and interventions for greater relevance and impact on disadvantaged communities. By engaging affected residents and stakeholders in informed deliberation and decision-making aboutcommunity health disparities, citizens' panels provide important guidance for (1) designing research studies to target the major health disparities affecting disadvantaged communities and (2) tailoring evidence-based interventions to the perspectives, practices, and preferences of disadvantaged residents. Employed as the primary methodology in 2 federally funded projects conducted in California and Arkansas between 2017 and 2019, citizens' panels offer a systematic method for obtaining rich community insight into health disparities, shaping community-informed solutions, and affording disadvantaged communities influence over public health decision-making to stimulate grassroots change and health equity. (Am J Public Health. 2020;110:166173. doi:10.2105/AJPH.2019.305450)

Inada, Haruhiko, MD,PhD., M.P.H., Tomio, Jun, MD,PhD., M.Sc, Nakahara, Shinji,M.D., PhD., & Ichikawa, Masao,PhD., M.P.H. (2020). Area-wide traffic-calming zone 30 policy of japan and incidence of road traffic injuries among cyclists and pedestrians. American Journal of Public Health, 110(2), 237-243. doi:https://doi.org/10.2105/AJPH.2019.305404

Objectives. To quantify the impact of the "Zone 30" policy introduced in September 2011 on the incidence of cyclist and pedestrian injuries in Japan. Methods.This was an interrupted time-series study. We used the data of cyclist and pedestrian injuries recorded by the Japanese police between 2005 and 2016. We evaluated the monthly number of deaths and serious injuries per person-time on narrow roads (width 5.5 m) to control for secular trends. We regressed the injury rate ratio on 2 predictors: the numbers of months after January 2005 and after September 2011. Using the regression results, we estimated the number of deaths and serious injuries prevented. Results. There were 266 939 deaths and serious injuries. By 2016, the cumulative changes in the rate ratio spanned from -0.26 to -0.046, depending onsexand age,and an estimated number of 1704 (95% confidence interval = 1293, 2198) injuries were prevented. Conclusions. The policy had a large preventive impact on cyclist and pedestrian deaths and serious injuries at the national level. (Am J Public Health. 2020;110: 237-243. doi:10.2105/AJPH.2019.305404)

Liber, A. C., M.S.P.H. (2020). The need for better compliance assurance mechanisms to protect young people. American Journal of Public Health, 110(2), 141-142. doi:https://doi.org/10.2105/AJPH.2019.305494

In their new article, Henriksen et al. declare that assurances of voluntary compliance (AVCs) are a promising regulatory mechanism to combat underage tobacco sales and subsequent use (p. 209). In one important case, their findings are heartening, but in two other respects, the findings should cause some concern. AVCs are a formal agreement, akin to a contract, between state attorneys general and a party that has violated, or is deemed likely to violate, consumer protection laws. The authors conducted their own secret shopper compliance checks of retailers in California that had signed AVCs with their state attorney general. They concluded that corporate-owned stores of retailers that signed AVCs violated minimum age of sale laws at a significantly lower rate than did franchisee-owned stores in the same retail chains. They also observed that violations of other AVC provisions, particularly agreements not to post advertisements that contained more than company trademarks, logos, and product prices, were widely disregarded. These contrasting findings point to the hope and worry associated with the implementation of AVCs.

Kantor, Leslie M,PhD., M.P.H., & Lindberg, L., PhD. (2020). Pleasure and sex education: The need for broadening both content and measurement. American Journal of Public Health, 110(2), 145-148. doi:https://doi.org/10.2105/AJPH.2019.305320

Sex education in the United States is limited in both its content and the measures used to collect data on what is taught. The risk-reduction framework that guides the teaching of sex education in the United States focuses almost exclusively on avoiding unintended pregnancy and sexually transmitted diseases, overlooking other critical topics

such as the information and skills needed to form healthy relationships and content related to sexual pleasure. Young people express frustration about the lack of information on sexuality and sexual behavior that is included in sex education programs; sexual and gender minority youths, in particular, feel overlooked by current approaches. International guidance provides a more robust framework for developing and measuring sex education and suggests a number of areas in which US sex education can improve to better meet the needs of youths. (Am J Public Health. 2020;110:145-148. doi:10.2105/ AJPH.2019.305320)

Sabbath, E. L., ScD., Hawkins, S. S., PhD., & Baum, C. F., PhD. (2020). State-level changes in firearm laws and workplace homicide rates: United states, 2011 to 2017. American Journal of Public Health, 110(2), 230-236. doi:https://doi.org/10.2105/AJPH.2019.305405

Objectives. To test whether year-over-year strengthening of state-level firearm laws is associated with decreases in workplace homicide rates. Methods. In this time-series ecological study of working people in all 50 US states, we used federal data on workplace homicides by state and year from 2011 to 2017, linked to an index of state-year firearm laws, to characterize the regulatory environment (overall and within legislative categories). We used generalized linear regression to model associations between changes in firearm laws and changes in workplace homicide rates the following year. Results. From 2011 to 2017, more than 3000 people died as a result of workplace homicides; over that period, 23 states strengthened firearm regulations and 23 weakened them. We modeled the impact of states strengthening laws within the interquartile range (IQR;equivalent to adding 20.5 firearm laws). This change was associated with a 3.7% reduction in the workplace homicide rate (95% confidence interval CI] = -3.86, -3.51). Positive IQR changes in specific categories of firearm laws-concealed carry permitting (-5.79%;95% CI= -6.09, -3.51), domestic violencerelated restrictions (-5.31%; 95% CI= -5.57, -5.05), and background checks (-5.07%; 95% CI = -5.32, -4.82)-were also associated with significant reductions. Conclusions. Strengthening state-level firearm laws may reduce the population-level mortality and morbidity burden posed by workplace homicides. (Am J Public Health. 2020;110:230-236. doi:10.2105/AJPH.2019.305405)

Caputi, T. L., M.P.H. (2020). The medical marijuana industry and the use of "research as marketing". American Journal of Public Health, 110(2), 174-175. doi:https://doi.org/10.2105/AJPH.2019.305477

Marijuana and marijuana-based medical products are now legally sold in 33 US states and most European Union countries. Widespread medical marijuana legalization has ushered in an unprecedented level of investment in marijuana, replacing small, independently owned storefronts with polished national and international corporations. As the industry has become more sophisticated, so has its marketing; a recent commentary I coauthored in the Journal of the American Medical Association surveys Big Marijuana's marketing strategy and summarizes how Big Marijuana companies convey poorly substantiated health claims to potential consumers. This editorial is intended to highlight one particularly pernicious marketing technique commonly employed by Big Marijuana companies-a technique I call "research as marketing." Essentially, marketers realize that social media sites and the 24-hour news cycle effectively deliver health information to consumers and that consumers are less-discerning auditors of scientific rigor than are federal regulators. Therefore, rather than invest in the multitude of expensive, large-scale clinical trials required to make regulator-endorsed health claims, marijuana companies sponsor and publicize the results of less-robust studies. Using weak research in their marketing, marijuana companies may mislead consumers into conflating, for example, the value of evidence from a series of highly rigorous Food and Drug Administration (FDA) prescription drug trials with that from a correlational or ecological study. For example, in a post with the headline "The Role of Medical Cannabis in Managing Symptoms of PTSD posttraumatic stress disorder]," multibillion dollar marijuana company Aphria cites a 25-participant imaging study to state "cannabinoid research suggests a link between endocannabinoid deficiencies and maladaptive brain changes after trauma exposures." Through authoritative-looking citations and biomedical jargon, consumers can be misled into believing that these relationships between marijuana use and health benefits are established scientific fact rather than budding theories. In addition to threatening the safety and autonomy of medical consumers, research as marketing has the potential to diminish the value of rigorous scientific research and undermine consumers' faith in medical sciences.

Mugore, M., Kalia, V., Lewandowski, S. A., & Gaspard, N. (2020). Malaria elimination eff orts. American Journal of Public Health, 110(2), 134. doi:https://doi.org/10.2105/AJPH.2019.305480

Gelpí-Acosta, C., PhD, Rodríguez-Díaz, C. E., PhD, Aponte-Meléndez, Y., MA, & Abadie, R., PhD. (2020). Puerto rican syndemics: Opiates, overdoses, HIV, and the hepatitis C virus in a context of ongoing crises. American Journal of Public Health, 110(2), 176-177. doi:https://doi.org/10.2105/AJPH.2019.305487

Puerto Rico is undergoing serious political and socioeconomic crises. Before the recent political turmoil forcing the resignation of (now former) Governor Ricardo Rossello, massive government debt had already led to unrest because of unpopular austerity measures (e.g., pension cuts, shrinking public education, and hospital closures). Additionally, a decades-long financial crisis had already triggered large-scale emigration from Puerto Rico (a colony of the United States) to the continental United States, a phenomenon that was significantly augmented by Hurricane Maria in 2017. Puerto Rico's vulnerability to natural disasters is compounded with its adverse political and socioeconomic conditions to create an exceptionally unstable public health environment.

Porta, Miquel, MD,PhD., M.P.H. (2020). Public health is not afraid of pleasure. American Journal of Public Health, 110(2), 133. doi:https://doi.org/10.2105/AJPH.2019.305496

Public health need not be afraid of or distant from pleasure. It is not distant even when "public health" is narrowly defined as the institutions and organizations that nominally work for public health. Public health is even closer to pleasure when we consider the diverse and positive influences on health from entertainment, leisure, and artistic institutions and businesses and from many educational, sports, social, or environmental policies. Such influences also contribute to happiness, well-being, and many forms of pleasure. All are natural components of health.

Hogan, A. J., PhD. (2020). Assessing global health care: The lens of disability. American Journal of Public Health, 110(2), 138-139. doi:https://doi.org/10.2105/AJPH.2019.305479

The Missing Billion by Hannah Kuper and Phyllis Heydt is reviewed.

Gruskin, Sofia,J.D., M.I.A., & Kismödi, Eszter, JD, LLM. (2020). A call for (renewed) commitment to sexual health, sexual rights, and sexual pleasure: A matter of health and well-being. American Journal of Public Health, 110(2), 159-160. doi:https://doi.org/10.2105/AJPH.2019.305497

In this charged political moment, and despite all efforts to the contrary, the public health community must take on, and not shy away from, a rights- and pleasure-affirming concern for sexual health and well-being. This is recognizably no small task. Failing to recognize that some of the primary factors behind sexual health risk are in fact issues that relate to sexual rights, desire, and pleasure, the global and national policy and programmatic standards that do exist, as well as the sexual health programs in place in most of the world, still primarily tend to address the negative consequences associated with sexuality, such as the prevention of unintended pregnancies, HIV, and sexually transmitted infections.

Ma, C., PhD., & Smith, T., PhD. (2020). Vulnerability of renters and low-income households to storm damage: Evidence from hurricane maria in puerto rico. American Journal of Public Health, 110(2), 196-202. doi:https://doi.org/10.2105/AJPH.2019.305438

Objectives. To identify disparities in home damage from Hurricane Maria among Puerto Rican households with different housing tenure and income levels. Methods. Using household inspection data obtained by the Federal Emergency Management Agency (FEMA), including an ordinal damage severity measure, we used generalized ordered logistic regression to estimate the relative risks of damage severities between renters and homeowners, and between households with different incomes. Results. With respect to the FEMA damage-severity classifications of "minor," "major," and "destroyed," renters were more at risk than homeowners for both "major-or-destroyed" and "destroyed" outcomes. Similarly, lower-income households were at greater risk for both "major-or-destroyed" and "destroyed" outcomes. When we allowed for an interaction between income and housing tenure, the difference in risk of "destroyed" outcomes between renters and homeowners was substantially greater at lower income levels.

Conclusions. These results provide evidence at the individual household level that renters and lower-income households are most vulnerable to hurricane damage. Our interaction results suggest that lower-income renters are particularly vulnerable to severe home damage. Public Health Implications. Disaster preparedness policies should raise structural standards for low-income housing to reduce risks of severe damage. (Am J Public Health. 2020;110:196-202. doi:10.2105/AJPH.2019.305438)

Moore, J. B.,PhD.M.S. (2020). A public health perspective that could shape the thinking of many. American Journal of Public Health, 110(2), 135-136. doi:https://doi.org/10.2105/AJPH.2019.305471