Social Science & Medicine 175 (2017) 219–227

Contents lists available at ScienceDirect

Social Science & Medicine

journal homepage: www.elsevier.com/locate/socscimed

Graphic health warnings as activators of social networks: A field experiment among individuals of low socioeconomic position

Shoba Ramanadhan [a, b, *], Rebekah H. Nagler [c], Rachel McCloud [a], Racquel Kohler [a, b], Kasisomayajula Viswanath [a, b]

[a] Center for Community-based Research, Dana-Farber Cancer Institute, 450 Brookline Ave, LW601, Boston, MA 02215, United States
[b] Department of Social and Behavioral Sciences, Harvard T.H. Chan School of Public Health, 677 Huntington Ave, Boston, MA 02115, United States
[c] School of Journalism and Mass Communication, University of Minnesota, 206 Church St SE, Minneapolis, MN 55455, United States

ARTICLE INFO

Article history:
Received 15 August 2016
Received in revised form
20 December 2016
Accepted 28 December 2016
Available online 18 January 2017

Keywords:
Social networks
Low socioeconomic position
Tobacco
Egocentric
Graphic health warnings

ABSTRACT

Rationale: Graphic health warnings (GHWs) on cigarette packages present an important tobacco control opportunity, particularly for vulnerable populations suffering a disproportionate tobacco burden. One mechanism by which GHWs may influence smoking outcomes is by prompting interpersonal discussions within health discussion networks (the set of personal contacts with whom an individual discusses health issues).
Objective: The study examined the association between GHW-prompted conversations within health discussion networks and key tobacco-related outcomes, with attention to valence and content of the discussions.
Method: Between August 2013 and April 2014, we recruited 1200 individuals from three communities in Massachusetts, emphasizing recruitment of individuals of low socioeconomic position (SEP) and members of other selected vulnerable groups. Respondents were exposed to the nine GHWs proposed by the FDA in 2011, asked a series of questions, and assessed at follow-up a few weeks later.
Results: A total of 806 individuals were included in this analysis. About 51% of respondents reported having a health discussion network, with significantly lower reports among African-Americans and Hispanics compared to Whites. Around 70% of respondents (smokers and nonsmokers) with health discussion networks reported having one or more conversations about the GHWs with network members, the bulk of which were negative and focused on warning others about smoking. For smokers, we found a small but positive association between the percentage of network conversations that were negative and reports of quit attempts.
Conclusion: The results point to a potential mechanism by which GHWs may impact tobacco-related outcomes, prompting further inquiry into the role of health discussion networks (and discussion networks, more broadly) in tobacco control among low SEP individuals.

1. Introduction

Adult cigarette smoking rates in the United States have declined in recent decades, from about 43% in 1965 to about 18% in 2014, but the gains have been unequally distributed. In 2014, the smoking prevalence among individuals (aged 25 or older) with less than a high school education was 43% versus 5% among those with a graduate degree, and the smoking prevalence among adults living below the poverty threshold was 26%, compared to 15% among those at or above the poverty threshold (Jamal et al., 2015; US Department of Health and Human Services, 2014). Smoking may be more difficult to address among groups of low socioeconomic position (SEP) due to a number of interacting drivers, including targeted marketing by the tobacco industry, lower access/adherence to cessation treatments, social norms, greater life stress/competing demands, and higher proportions of smokers in their social networks (Christakis and Fowler, 2008; Hiscock et al., 2012;

* Corresponding author. 450 Brookline Ave, LW 601, Boston, MA 02215, United States.
E-mail addresses: shoba_ramanadhan@dfci.harvard.edu (S. Ramanadhan), nagle026@umn.edu (R.H. Nagler), rachel_faulkenberry@dfci.harvard.edu (R. McCloud), racquel_kohler@dfci.harvard.edu (R. Kohler), vish_viswanath@dfci.harvard.edu (K. Viswanath).

http://dx.doi.org/10.1016/j.socscimed.2016.12.044
0277-9536/

Hitchman et al., 2014). Given the complexity of these challenges, multi-prong solutions are required to reduce tobacco use among low SEP populations. In addition to leveraging evidence-based programs for tobacco cessation at the individual level, attention is increasingly being paid to population-level interventions and policy solutions (National Institutes of Health Office of the Director, 2006).

1.1. Graphic health warnings

A prime example of a population-level solution is the recommendation from the World Health Organization's Framework Convention on Tobacco Control (FCTC) to place prominent graphic health warnings (GHWs) on cigarette packs. These labels cover 30–50% of cigarette package covers and relay information regarding the consequences of tobacco use, often including images (World Health Organization, 2003). GHWs leverage the opportunity to communicate the risks of smoking with smokers at the time of the behavior—up to 7000 times per year for those who smoke a pack per day—and can also relay information to nonsmokers who are exposed to the packs when the product is being used or is on display (Hammond, 2011). A recent systematic review of longitudinal observational studies found that strengthened warnings (implemented nationally) were associated with increases in knowledge and calls to quitlines, as well as decreases in smoking behavior (Noar et al., 2016a). A meta-analysis of experimental data found that, compared to text-only warnings, pictorial warnings were perceived as more effective and were better able to attract and hold attention, generate reactions (cognitive and emotional), induce negative attitudes about smoking and cigarette packs, and increase intentions to quit and to not initiate smoking (Noar et al., 2016b). As summarized by Cappella (2016), when considering the body of work on GHWs, a "picture of the causal effectiveness of warning labels emerges that is difficult to ignore" (p.132). Recent experimental studies have suggested that GHWs may present an important opportunity to address disparities, as they were similarly effective across diverse racial/ethnic and socioeconomic populations (Cantrell et al., 2013; Gibson et al., 2015).

1.2. Interpersonal discussions

One way in which GHWs may support tobacco control is by prompting interpersonal discussions among those exposed to the warnings. Interpersonal discussions provide individuals with opportunities to share, engage with, and process information and access social support (Hall et al., 2015; McAfee et al., 2013; Southwell and Yzer, 2007). Interpersonal discussions have been shown to increase the impact of tobacco control campaign messages on behavioral intentions and behavior, beyond the direct effects of campaigns (Dunlop et al., 2008; Durkin and Wakefield, 2006; van den Putte et al., 2011). Recent studies show that GHWs prompted conversations about quitting and the health risks of smoking among smokers in the US (Hall et al., 2015) and that such conversations predicted quit attempts in Canada, Australia, and Mexico (Thrasher et al., 2016).

The valence of interpersonal discussions prompted by health promotion campaigns is also hypothesized to have an impact on behavior. For example, in the context of HPV vaccination, conversations that were favorable (i.e., supported the vaccine) were linked to health-promotive norms and attitudes as well as intentions to receive the HPV vaccine (Dunlop et al., 2010). In the context of condom use in South India, positive campaign-prompted conversations were shown to predict greater health-promotive attitudes, higher self-efficacy for condom use, and subjective and descriptive norms supporting condom use (Frank et al., 2012). A study of binge drinking in the Netherlands found that negative conversational valence about alcohol was linked to greater intention to refrain from binge drinking (Hendriks et al., 2012). It is important to note that interpersonal communication can also have a dampening effect on campaigns and serve as a competing channel of information (Southwell and Yzer, 2007).

1.3. Health discussion networks

Interpersonal discussions do not occur in a vacuum and studying them requires investigation into the broader social context in which they occur, including the social networks that support health-related conversations (Ackerson and Viswanath, 2009). Social networks affect health through a number of key mechanisms, including provision of social support, social influence, social engagement, exposure through direct connections, and access to resources (Berkman et al., 2000; House et al., 1988). The quality, quantity, and types of ties an individual possesses, as well as the position s/he plays in social networks, are all important drivers of behavior change and health outcomes (Perkins et al., 2015; Valente, 2012). As Borgatti et al. (2009), "One of the most potent ideas in the social sciences is the notion that individuals are embedded in thick webs of social relationships and interactions" (p. 892). The challenge, then, is to understand how these webs influence/are influenced by health behaviors.

Individuals have a range of social networks, which can be differentially accessed for specific functions—for example, searching for a job versus finding medical information (Wellman and Wortley, 1989). *Health discussion networks*, or the set of interpersonal connections with whom individuals discuss health matters, are expected to play an important role regarding the access to resources and supports needed to maintain abstinence among nonsmokers and support cessation among smokers. These networks have been shown to impact attitudes; access to services, emotional support, advice, information, and the understanding individuals develop about health issues (Abbott et al., 2012; Perry and Pescosolido, 2010; Pescosolido, 1991, 1992). Interpersonal communication networks can accelerate the spread of new information (Rogers, 2003) and lead to greater exposure to health information (Viswanath et al., 2006). Given that networks spread diverse content, the effects of health discussion networks can be health promoting (e.g., facilitating access to cessation services) or risk promoting (e.g., spreading pro-tobacco norms).

Health discussion networks are expected to be sources of social capital, the resources embedded within social relationships that can be mobilized to meet an individual's goals (Lin, 2001). By studying the structure of health discussion networks and the resources that flow within them, we can better understand how these networks influence and give meaning to context (Pescosolido, 2006) and can then more effectively shape interventions and communication campaigns. A network approach, as opposed to assessing GHW-prompted conversations among individuals, allows us to measure aspects of the context in which health behaviors are occurring, rather than focusing solely on individual-level attributes. The use of egocentric analysis (focused on individuals' networks) provides insight into each respondent's personal network environment in a manner that could not be assessed using traditional methods (Valente, 2010).

Although the body of work on the effectiveness of GHWs generated in other countries is large and compelling, the moderating influences of social structural factors such as SEP that drive tobacco-related disparities in the US are much less clear. The focus on low SEP groups is vital, given the impact of *communication inequalities*, or differences among social groups in the generation, manipulation, and distribution of information at the group level