Evaluating the perceived effectiveness of pregnancy-related cigarette package health warning labels among different gender/age groups

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HIGHLIGHTS

- Pregnancy-related HWLs with graphic imagery in Mexico and Australia effectively target women of reproductive age.
- Pregnancy-related HWL with symbolic imagery in Canada do not effectively target women of reproductive age.
- In the US where text based HWLs are used, the pregnancy-related HWL targets women of reproductive age.

ABSTRACT

Introduction: The impact of pregnancy-related health warning labels (HWLs) appearing on cigarette packages on women of reproductive age and other socio-demographic groups is not well understood. The current study analyzes how different age/gender groups respond to pregnancy-related HWLs as compared to non-pregnancy HWLs.
Methods: Data were analyzed from four waves of an online longitudinal study with adult smokers aged 18–64 in Australia, Canada, Mexico, and the US. Participants were classified into four age\gender groups: women 40 and under; men 40 and under; women over 40; men over 40. Participants rated one pregnancy-related and several non-pregnancy related labels on worry, believability, and motivation to quit. Country-specific adjusted linear GEE were estimated regressing ratings for each of the three key outcomes for 1) pregnancy-related HWLs and 2) a rating difference score that subtracted the average ratings of the non-pregnancy warning from the rating of the pregnancy warning. All models adjusted for socio-demographics and smoking related variables.
Results: In Mexico and Australia, where graphic pregnancy-related HWL imagery is used (i.e., premature infant), women of reproductive age reported stronger believability, worry, and quit motivation than all other groups. Results were similar in the US, where text only HWLs are used. In contrast in Canada, where the pregnancy-related HWL imagery features a pregnant woman, ratings were unassociated with gender/age groups. Stronger effects among women of reproductive age were limited to pregnancy HWLs in each country, except Canada.
Conclusions: HWLs that depict graphic effects to illustrate smoking-related pregnancy risks appear to be perceived as particularly effective among women of reproductive age.

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1. Introduction

The possible effects on fetal health from smoking during pregnancy are well documented and range from low birth weight to stillbirth (World Health Organization, 2013). Rates of self-reported smoking during pregnancy vary widely between countries with 5–8% in Mexico (Frank et al., 2004; Sánchez-Zamorano, Téllez-Rojo, & Hernández-Avilla, 2004), 10% in the United States (US) (Centers for Disease Control, CDC, 2015), 13% in Australia (Li, Zeki, Hilder, & Sullivan, 2013), and 23% in Canada (Cui, Shooshtari, Forget, Clara, &

Cheung, 2014). Some women who smoke while pregnant, however, attempt to conceal this behavior due to social stigma and social desirability (Borland, Babyan, Irfan, & Schwartz, 2013; Wigginton & Lee, 2013). Hence, reported smoking rates may be higher due to nondisclosure of smoking behavior, which has been documented among pregnant women (Dietz et al., 2010; Shipton et al., 2009). Cigarette package health warning labels (HWLs) that address the harmful effects of smoking during pregnancy and promote resources for smoking cessation could motivate women to quit during pregnancy or better still, before they become pregnant.

Prior studies have examined smokers' first-time responses to pictorial HWLs with pregnancy imagery (Cantrell et al., 2013; Hammond et al., 2012; O'Hegarty et al., 2006; Peters et al., 2007; Vardavas, Connolly, Karamanolis, & Kafatos, 2009), but these studies differ from

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naturalistic exposures, where smokers are repeatedly exposed to warnings on cigarette packs. Moreover, no studies of which we are aware have evaluated smoker's responses to text based cigarette package warning labels that address smoking during pregnancy. The current paper examines smoker's responses to pregnancy and non-pregnancy related warning labels, both in countries where warning labels include prominent pictures (Australia, Canada, Mexico) and where warnings are small and include only text (US) after the warnings have been included on cigarette packaging. As such, this study advances prior research by providing an assessment of the perceived efficacy of warning labels that smokers have been repeatedly exposed to under naturalistic conditions.

1.1. Pregnancy-related HWLs

Several experimental studies evaluating the perceived effectiveness of pictorial HWLs compared to text only HWLs have included pregnancy-themed content as one of several test labels (Cantrell et al., 2013; Hammond et al., 2012; O'Hegarty et al., 2006; Peters et al., 2007; Vardavas et al., 2009). In all of these studies, pictorial HWLs were perceived as more effective than text only warnings. These images also seem to resonate with youth and adults regardless of cultural background. For example, in studies in the US (Peters et al., 2007), Brazil (Nascimento et al., 2008) and Greece (Vardavas et al., 2009), adults and/or adolescents ranked pregnancy-related HWLs as more effective and/or aversive than other pictorial HWLs. None of these studies, however, exposed participants to the same HWL imagery that currently appeared on cigarette packages in the country in which participants resided. A limited number of qualitative studies in Australia have assessed the impact of the pregnancy-related HWLs appearing on cigarettes packages (Gould et al., 2013; Hauck, Ronchi, Lourey, & Lewis, 2013; Miller, Quester, Hill, & Hiller, 2011). Findings indicate that some pregnant women attribute their knowledge of the negative health effects of smoking during pregnancy to the pictorial HWLs (Gould et al., 2013; Hauck et al., 2013). These studies did not address, however, the impact of pregnancy-related HWLs on perceptions of smoking or quit motivation.

1.2. HWL policy context in Australia, Canada, Mexico, and the US

Smokers in Canada, Australia, and Mexico are exposed to information about the harms of smoking during pregnancy through pictorial HWLs, whereas only text-based HWLs are on packs in the US. Three of the four countries included in the current study had implemented new pregnancy-related pictorial content 3–5 months before data collection. Warning labels in the US have remained the same since 1985. Canada first implemented pictorial HWLs in 2001 and introduced its second round of warnings in 2012. One of the new HWLs featured a pregnant woman and replaced imagery of a baby in ICU. Australia implemented HWLs in 2006 and introduced a new round of imagery in December of 2012. The new pregnancy related HWL featured a baby in an ICU, which was similar to the old image yet depicted a close up of the baby. Mexico first implemented HWLs in 2010 and has the most rapid rotation of new HWL content in the world, introducing new content every 6 months. The most recent pregnancy-related image featured a low birth weight infant in an ICU and started appearing on cigarette packs in late 2012.

1.3. Study aims

To be most effective, pregnancy-related HWLs should target women of reproductive age but their impact on this and other socio-demographic groups is not well understood. Indeed, targeting to specific populations through HWLs could potentially weaken overall HWL effects among other audiences that are not specifically targeted (e.g., males, older women). Therefore this study had two objectives: 1) To determine whether women of reproductive age (≤40) are more responsive to pregnancy-related HWLs than other age/gender groups (i.e., men ≤ 40, women > 40, men > 40); and 2) To determine whether pregnancy-related HWLs are perceived as more effective than non-pregnancy related HWLs among women of reproductive age as compared to other age/gender groups. We hypothesized that women of reproductive age would be more responsive to HWLs with pregnancy-related content regardless of the type of imagery and/or text featured in the HWL.

2. Methods

2.1. Sample

Data were drawn from a longitudinal survey of adult smokers recruited from Global Market Insights (GMI: www.gmi-mr.com) online consumer panels in Canada, Australia, the US, and Mexico. Recruitment of participants in each country involved sending invitations to panel participants who were of eligible age and who were known smokers, as well as from general population samples for which smoking status was unknown. Eligible participants were smokers aged 18 to 64 years, who have smoked at least 100 cigarettes in their lifetime, and have smoked at least once in the prior month. Response rates to invitation emails in each country at each wave ranged between 13%–19%. In each country, approximately 1000 people participated in each wave of data collection, with an additional oversample of 400 Latinos in the US to allow for comparisons with Mexico. Follow-up rates from prior waves ranged from 49%–69%, and new participants were recruited at each wave to maintain the sample size in each country over time. For the current analysis, waves 1 and 2 for Canada (September 2012 and January 2013), waves 2 and 3 for the US (January 2013 and May 2013), and waves 3 and 4 for Australia and Mexico (May 2013 and September 2013), were analyzed. Waves of data used in the analysis were chosen so as to coincide with the timing of pregnancy-related HWL implementation in each country to allow for more comparable data. For example, for Canada, Australia, and Mexico, the first wave of data included in the analysis was 3 to 5 months after new pictorial HWLs with pregnancy imagery were implemented. For the US, no HWL changes were implemented around the time of data collection and therefore the first waves of data collection for the US were included.

2.2. Health warning labels (HWLs)

Participants were shown and asked to respond to 4–8 cigarette pack HWLs (presented in random order) that appeared on packs in their respective countries. Participants in Canada, Australia, and Mexico were shown one pictorial pregnancy-related HWL (Fig. 1) in addition to several non-pregnancy-related pictorial HWLs. These HWLs included content on: bladder cancer, blindness, emphysema, heart disease, lung cancer, oral cancer, throat cancer in Canada; blindness, emphysema, gangrene, lung cancer, oral cancer in Australia; and emphysema, lung cancer, gangrene, oral cancer, and throat cancer in Mexico.

In the US, participants were shown all four text only HWLs that have been on packs since 1985. One discusses the effects of smoking during pregnancy (Fig. 1). The label that states "Smoking Causes Lung Cancer, Heart Disease, Emphysema, and May Complicate Pregnancy" was excluded from the current analyses since it discussed pregnancy and other health effects simultaneously.

3. Measures

3.1. Dependent variables

After viewing each HWL participants reported responses ranging from 1 (not at all) to 9 (extremely) on the extent to which the HWL: