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COMMENTARY



# Pictorial cigarette pack warnings increase quitting: a comment on Kok et al.

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## Effectiveness of pictorial warnings

Tobacco use is the leading preventable cause of death in the world. No other behaviour kills as many people (World Health Organization, 2013). For this reason, actions that can reduce cigarette smoking, by preventing initiation or helping people quit, are critically important. Effective approaches include policies that raise the cost of cigarettes and clinical interventions for cessation (International Agency for Research on Cancer, 2011; Stead et al., 2012).

Our recent randomised trial provides convincing evidence of the behavioural effects of pictorial cigarette pack warnings (Brewer et al., 2016). We randomly assigned 2149 adult smokers in two US cities to have warnings on the side of their packs for 4 weeks. The trial was designed to estimate the effect of the US adopting newly legislated pictorial warnings. Thus, our intervention warnings had newly required messages and images of the harms of smoking; control warnings were the ones in use in the US for the past 30 years. In the trial, the pictorial cigarette pack warnings increased forgoing cigarettes, quit attempts and quitting for a week or more among a diverse community sample. The trial findings corroborate the conclusion of a recent systematic review of observational longitudinal studies ($n = 812{,}363$) showing that implementing stronger (typically pictorial) cigarette pack warnings was associated with reductions in smoking (Noar, Francis, et al., 2016). A recent modelling paper also estimated that implementing pictorial warnings in the US would prevent over 650,000 deaths over the next 50 years (Levy, Mays, Yuan, Hammond, & Thrasher, 2016). Kok, Peters, Kessels, Ten Hoor, and Ruiter (2017) referred to Malouff et al.'s (2012) small pictorial pack warning trial with 56 people which up until recently was the only experiment that had examined behavioural outcomes. That experiment offered useful information on psychosocial outcomes but was underpowered to detect any effects on behaviour and thus did not yield evidence about behaviour one way or another. Thus, we believe it is now reasonable to update Kok et al.'s conclusion that 'convincing evidence regarding [pictorial warnings] is not available' (p. 14). We now know that that pictorial warnings increase quitting.

## Other issues

When the US implements pictorial warnings, they may not include an efficacy message. A 2012 lawsuit that suspended the implementation of pictorial pack warnings focused in part on the initial proposal to include a phone number of a toll-free quit line (1-800-QUIT-NOW). Some legal scholars expect that the US will not challenge that part of the ruling given the quirks of commercial free speech protections in the US. A high-self-efficacy, high-threat message of the sort favoured by Kok et al. may not be possible at present on US cigarette packs, but warnings without an explicit self-

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**Table 1.** Impact of fear communication stratified by efficacy message.

| Source | *k* | Outcome | With efficacy *d* | Without efficacy *d* | Efficacy hypothesis supported |
|---|---|---|---|---|---|
| Tannenbaum et al. (2015) | 110 | Attitudes | .39* | .14* | Weak hypothesis |
| Tannenbaum et al. (2015) | 161 | Intentions | .40* | .27* | Weak hypothesis |
| Tannenbaum et al. (2015) | 70 | Behavior | .43* | .14 | Weak hypothesis |
| Peters, Ruiter, and Kok (2013) | 7 | Behavior | .40* | −.14 | Weak hypothesis |
| Peters et al. (2013) | 6 | Behavior | .31* | −.31 | Weak hypothesis |

Note: *k*: number of studies; *d*: standardised mean difference.
*$p < .05$.

efficacy message could still have a substantial impact on public health even if the absolute impact on smoking is small. For example, pictorial warnings – which did not include the quit line number in our trial – were effective without a self-efficacy message and even caused small increases in quitting self-efficacy (Brewer et al., 2018). That said, we agree with Kok et al. that the warnings would likely work even better with a self-efficacy message, and that self-efficacy messages should accompany fear communications whenever possible.

So why might pictorial cigarette pack warnings work even when the self-efficacy hypothesis suggests otherwise? Pictorial pack warnings in our trial were effective because they increased negative affect (Brewer et al., 2018). Mediational analysis showed that the pictorial warnings increased quit attempts because they increased fear and other components of negative affect such as disgust and sadness. Smokers are skilled at denigrating and rejecting risk messages, but cigarette pack warnings may act as a constant risk reminder that keeps the risk information literally at hand. Furthermore, cigarette pack warnings pair the warning directly with the behaviour, with many exposures over an extended period (~600 exposures over the course of our trial for a pack a day smoker). One consequence is that pictorial warnings make smokers think about the messages, the harms of smoking and quitting (Brewer et al., 2016; Noar et al., 2017), even as they do not change perceived risk (Noar, Hall, et al., 2016). This is very different from many fear elicitations, such as the seminal work by Leventhal, Singer, and Jones (1965) and Leventhal, Jones, and Trembly (1966), that use one time exposure to fear communications, removed in time and place from the opportunity to engage in the target behaviour. Pictorial warning exposure leads to weekly increases in intentions to quit smoking over the short term (Parada, Hall, Boynton, & Brewer, 2017), and countries often rotate among different warnings on packs to expose smokers to different messages over time. Because pictorial warnings' potency may begin to wane after several months or years, however, it is important to periodically refresh them with new content (Borland et al., 2009; Hitchman, Driezen, Logel, Hammond, & Fong, 2014).

An important question is whether fear communication works in contexts beyond pictorial pack warnings. The strong efficacy statement hypothesis is that 'fear appeals without efficacy statements will produce negative effects (i.e. will backfire)'; while the weak hypothesis is that 'fear appeals without efficacy statements will produce weaker (i.e. less positive or null) effects relative to fear appeals with efficacy statements' (Tannenbaum et al., 2015, p. 1180). Two recent meta-analyses show clear support for the weak hypothesis (Table 1), consistent with previous reviews (De Hoog, Stroebe, & De Wit, 2007; Witte & Allen, 2000). These findings are reassuring because they demonstrate that fear appeals without efficacy statements do not backfire. Furthermore, fear communication without an efficacy statement can improve attitudes and motivate behaviour change.

## Conclusion

Reasonable people can disagree about how to interpret the available evidence on fear communications in various domains, but the accumulated evidence supporting pictorial cigarette pack warnings is strong. Based on that evidence, we believe that pictorial warnings will reduce smoking (Brewer et al., 2016; Levy et al., 2016; Noar, Francis, et al., 2016). They will do so by increasing fear and other negative affect and by increasing thinking about the warnings, among other psychological

mechanisms (Brewer et al., 2018). Perhaps pictorial warnings are a special case, falling outside the territory covered by the self-efficacy hypothesis. All of this theorising is interesting and important, and we behavioural scientists will spend the next decades refining hypotheses about how to improve fear communications. As we do so, policy-makers in the US can help reduce smoking and save lives by joining over 100 countries and jurisdictions that have required pictorial cigarette pack warnings (Canadian Cancer Society, 2016).

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