# Smoking and Pictorial Warning Labels: What Does the Evidence Show?

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# Smoking and Graphic Warning Labels

## Background

Tobacco use is the leading preventable cause of death in the United States, and cigarette smoking is responsible for more than 480,000 deaths annually.[1] In 1966, the United States became the first nation to mandate warning labels on cigarette packs, but it has since fallen behind much of the world. The U.S. has not changed the four text warnings on the side of cigarette packs since 1984. In 2000-01, Canada became the first nation to implement graphic or pictorial warning labels (GWLs or PWLs), which by 2014 had been adopted by at least 77 nations, according to the Canadian Cancer Society.[2] These warnings covered half of the front and back of cigarette packs with both a text message and a picture illustrating the warning in the text. Although the U.S. Congress mandated nine health messages and pictorial warnings in the 2009 Family Smoking Prevention and Tobacco Control Act, efforts to implement the labels by the Food and Drug Administration (FDA) have been stymied by tobacco-industry court challenges.

Although a U.S. appeals court in Cincinnati upheld the warning label law,[3] another appeals court in the District of Columbia issued a ruling against the specific images selected by the FDA, saying in 2012 that the FDA "has not provided a shred of evidence" that those graphic warnings would reduce smoking.[4] The D.C. court said that the nine FDA-proposed labels "do not convey any warning information at all" and constituted "unabashed attempts to evoke emotion (and perhaps embarrassment) and browbeat consumers into quitting." In 2013 the Justice Department declined to appeal the D.C. court ruling and said it would conduct research into new labels consistent with the law and the court concerns.

## APPC Research

For more than a decade, the Annenberg Public Policy Center (APPC) has conducted research into the use of PWLs on cigarette packages as a means to highlight the risks of this product. This research was initially conducted to encourage the U.S. to implement pictorial warnings as was first done in Canada. In the first study conducted by APPC on graphic warnings published in

2007 in *Nicotine & Tobacco Research*, researchers at Decision Research in Oregon collaborated on a study comparing the Canadian warnings with the current Surgeon General warnings.[5] That study showed that the Canadian warnings more effectively communicated the harms of smoking and that most U.S. smokers found the warnings acceptable. A study conducted by a team of marketing researchers published in 2006 also found greater impact of pictorial warnings.

With the passage of legislation mandating the use of pictorial warnings in 2009, APPC's research has focused on identifying the characteristics that make these warnings effective. In an effort to respond to the court's ruling, APPC along with Ellen Peters and colleagues at The Ohio State University conducted a study published in *PLOS ONE* showing that 28 days of naturalistic exposure to the pictorial warnings proposed by the FDA were more successful than the nine basic text warnings in encouraging smokers to consider quitting and educating them about smoking risks.[6] This study, the first naturalistic clinical trial of warning labels in the United States, found that the emotional response produced by graphic warnings is a crucial ingredient in the labels' success in educating smokers about the health risks of the habit. The study involved 244 adults living in Philadelphia and Columbus, Ohio, who smoked from five to 40 cigarettes a day. Smokers exposed to graphic warning labels over a four-week period were better able to recall the warnings and health risks of smoking than those who were shown only text warnings, and the emotional effects of the warnings transferred to greater intentions to quit. These findings directly responded to the D.C. court's concern that the images selected by the FDA do not convey any warning information and that the emotions evoked by them are irrelevant to their purpose.

A recently published naturalistic exposure study conducted by researchers at the University of North Carolina with a much larger sample of smokers found that the FDA's proposed warnings were more effective in getting smokers to quit the habit than the current Surgeon General warnings that appear on the sides of cigarette packs.[7] Although that study did not isolate the effects of the pictures versus the text in the proposed warnings, those findings along with the APPC study suggest that pictorial warnings will be more effective than text-only warnings at getting smokers to try to quit their habit.

In an earlier study conducted by APPC distinguished research fellow Andrew Strasser, a pictorial warning in a cigarette print ad was found to be more noticeable than the current Surgeon General warning and also to produce greater recall of the warning information than the current warning.[8] This study corroborates findings from studies of warnings on cigarette packs and shows the greater efficacy of pictorial warnings when applied to advertising.

**EEG and fMRI Studies**

In a further effort to determine the mechanisms that enable pictures to better convey the risks of smoking, APPC researchers conducted a study using electroencephalography, or EEG. The study, published in *Addiction Biology*, found that warnings with more emotionally evocative images showing the risks of smoking are more effective than blander images at reducing the brain activity that underlies the urge to smoke.[9] In the study, 25 smokers were shown random sequences of smoking and nonsmoking images preceded by graphic warning labels or neutral images. The study found that the impact of smoking cues that grab the attention of a smoker's brain, such as the image of a lit cigarette, can be significantly reduced when smokers are first shown an emotionally evocative graphic warning.

In the first published functional magnetic resonance imaging, or fMRI, study of smokers' response to graphic warning labels, APPC researchers again found that warnings with more emotionally powerful images were more impactful than images lacking in emotion.[10] The study, published in *Tobacco Control*, found that more evocative warnings triggered stronger responses in the limbic system, brain structures associated with memory for emotions, such as fear. Those responses were also associated with better recognition of the warnings shortly after exposure to them.

One of the concerns raised by the courts was the frequent finding that warning labels do not directly lead to increased intentions to quit. In response to this concern APPC researchers, again in collaboration with Ellen Peters at Ohio State, showed that warnings with emotional images do lead to more worry in smokers, and that this response further predicts important outcomes, such as the perceived risks of smoking and interest in quitting. This analysis also showed that the text

used to support the warning can affect the credibility of the warning and lead to differential acceptance of its claims.

Aside from the above research, which directly focused on the concerns raised by the courts, APPC researchers have also examined differences in smoker characteristics that moderate the effects of warning labels. One concern about strong images in warning labels is that they will produce resistance in smokers, especially those with little belief in their ability to quit.[11] This characteristic, known as self-efficacy for quitting, may be a limiting factor in smokers' responses to warnings. In a study with more than 3,000 cigarette smokers published in *PLOS ONE*, APPC researchers found that although pictorial warnings, such as those proposed by the FDA, make smokers worried about their habit, it is primarily smokers with an intermediate level of self-efficacy who are likely to work hard to quit. Smokers with high efficacy think they can quit anytime and so are less motivated to try. Smokers with low efficacy think they can't quit, and this saps their motivation to try. This prediction is the subject of further research yet to be published, based on the clinical trial described above.

**Future issues and questions**

Contrary to the ruling of the D.C. court, research by APPC has found that evoking emotion that is supportive of the risks detailed in the text may be essential to making the warning labels more memorable and effective. The evidence that has accumulated suggests that it is time for the FDA to push forward and to test new pictorial labels that will meet the standards set by the courts.[12]

Despite the growing evidence that pictorial warnings can more effectively communicate the risks of smoking, there is less evidence about the efficacy of warnings for adolescents. Most of the research on warning labels has been conducted with adults. More research is needed with this critical audience as smoking is typically initiated in adolescence, and to be successful in reducing the appeal of cigarettes, warnings should deter adolescents from trying and progressing in a nicotine habit. APPC is currently in the process of analyzing a large study with adolescents to determine the efficacy of pictorial warnings for this age group, with both current tobacco users and those susceptible to trying smoking.

Another issue deserving of further research is the need to identify the most effective images to accompany the nine text messages mandated by Congress. The images selected by the FDA were not subject to extensive pre-testing and more research is needed to identify the best images to reach different audiences and to maximally enhance the effectiveness of warning text.

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## Additional Readings


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