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# Adverse effects of public health interventions: a conceptual framework

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*Public health interventions may have a range of adverse effects, which are rarely measured or well understood.*

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## ABSTRACT

Public health interventions may have a range of adverse effects. However, there is limited guidance as to how evaluations should address the possibility of adverse effects. This discussion paper briefly presents a framework for thinking about the potential harms of public health interventions, focusing on the following categories: direct harms; psychological harms; equity harms; group and social harms; and opportunity harms. We conclude that the possibility of adverse effects needs to be taken into account by those implementing and evaluating interventions, and requires a broad perspective on the potential impacts of public health strategies.

## INTRODUCTION

Many public health interventions may have unintended effects. The possibility of positive 'knock-on' effects beyond those envisaged by intervention developers—for example, improved social interaction as a result of environmental changes to increase walkability—is frequently discussed. However, unintended adverse effects may also frequently result from well-intentioned interventions,<sup>1</sup> but are rarely addressed in the literature. Researchers in some subfields, such as suicide prevention<sup>2</sup> and vaccination, have given sustained attention to the possibility of adverse 'iatrogenic' effects. However, in many areas of public health research, the picture is highly unclear: most systematic reviews do not extract data on adverse effects, and those that do often find little or no evidence.<sup>3</sup> In this respect, public health contrasts markedly with clinical medicine, where there is a substantial literature on adverse events and patient safety, and the Hippocratic injunction to 'do no harm' is arguably more salient.

It is clearly important for people implementing and evaluating public health interventions to consider the possibility of unintended effects, particularly adverse effects. However, limited guidance is available on how to approach this question in a structured way. The aim of this paper is to illustrate five types of harms that may potentially be brought about by public health interventions in order to begin the process of formulating an analytical framework to understand harms. The paper focuses on public health interventions; clinical medicine and non-health policy sectors, which present rather different challenges, are not included here, although the latter would be a useful focus of further work. The categorisation presented here is not comprehensive, and not all adverse effects measured in evaluations may be readily assignable to a category; nonetheless, it may be of value as an

initial broad framework for thinking about potential harms, and the wider impacts of public health policy interventions.

## DIRECT HARMS

In some cases, desired health outcomes may have directly harmful effects, regardless of the content of the intervention targeting them. For example, sun exposure is associated with a reduced risk of some cancers.<sup>4</sup> This implies that skin cancer prevention programmes which successfully reduce sun exposure may risk inadvertently increasing the risk of other cancers. Similarly, programmes to increase sports participation may increase injury risk. More generally, in many cases the evidence for the longer-term health impacts of behaviour change is lacking, as witnessed by the recent controversy over body weight and mortality sparked by the work of Flegal *et al.*<sup>5</sup>

## PSYCHOLOGICAL HARMS

A more indirect category of harms is the possibility of negative psychological impacts on individuals as a result of interventions. Perhaps, most obviously, some population screening programmes may produce high numbers of false-positive results, potentially leading to substantial adverse effects in terms of psychological stress and unnecessary treatment;<sup>6–10</sup> the NHS Health Check programme has recently been criticised on these grounds.<sup>11</sup> Some universal psychological interventions, such as 'debriefing' after traumatic events, may have adverse mental health impacts.<sup>12</sup> The dissemination of health messages through educational or media campaigns may generate damaging feelings of worry or guilt, which can have negative effects not only on general well-being but, in many cases, on the targeted behaviours themselves.<sup>13 14</sup> While most media campaigns do now try to avoid explicitly guilt-oriented messages, there is still considerable potential for harms, which have rarely been investigated systematically.

More indirect psychological harms may result where targeted health behaviours are bound up with individuals' social identity or relationships with others. It is hard to say how serious this potential for adverse effects may be, since such socio-psychological harms are rarely considered in evaluations of interventions. However, the qualitative literature suggests that, for example, moderate consumption of alcohol or other drugs may facilitate social interactions,<sup>15 16</sup> and that unprotected sex may facilitate trust and intimacy within sexual relationships.<sup>17 18</sup> It is thus possible that interventions targeting these behaviours could have negative impacts on social or intimate relationships.



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## EQUITY HARMS

Interventions may create harm by worsening health inequalities. That is, some successful interventions may improve outcomes across the population, but exacerbate existing inequalities by benefiting privileged groups more than disadvantaged groups.<sup>19–21</sup> This has particularly been a concern with individualistic or ‘responsibilising’ approaches to health promotion which, it is often argued, tend to benefit those who are in least need of them.<sup>22–23</sup> It has also been argued that targeted or ‘high-risk’ approaches are more likely than population-level initiatives to widen health inequalities.<sup>24</sup> Although the evidence base on such ‘intervention-generated inequalities’ is limited in extent, there is fairly reliable evidence that some interventions do widen inequalities, particularly media campaigns for smoking cessation.<sup>25</sup>

Equity harms raise complex ethical and methodological questions, since they may exist even where no individual in the population is worse off as a direct result of the intervention. However, given the evidence that inequality at a societal level is itself harmful across the population as a whole,<sup>26</sup> it is clear that effects on equity are an important dimension of the potential harms of interventions.

## GROUP AND SOCIAL HARMS

Group-based interventions may inadvertently create harms by singling out a particular subset of the population, or by the effects of bringing them together. A particular concern in the literature has been the so-called ‘deviancy training’ effect in group-based targeted interventions with young people for outcomes such as anti-social behaviour or drug use. That is, group interventions may generate harms by facilitating social interaction between people who are already partially socialised into marginal or ‘deviant’ norms,<sup>27–28</sup> although the empirical evidence is mixed.<sup>29</sup>

Targeting particular groups or behaviours for intervention may contribute to stigmatising them. This may operate at an individual level, for example, in interventions targeting obesity,<sup>30–32</sup> or on a larger scale, where the targeting of social interventions at disadvantaged groups or areas may exacerbate the stigma experienced by their members or residents. It may also contribute to divisions between groups, as in the case of alcohol restrictions in Aboriginal communities in Australia.<sup>33–34</sup>

More broadly, interventions may have negative impacts at the level of social norms or perceptions. For example, advocacy to promote bicycle helmets may contribute to an exaggerated perception of the injury risks of cycling, and hence lower cycling rates.<sup>35</sup> This type of harm overlaps with those already discussed to the extent that interventions may contribute to culturally entrenched stereotypes of, for example, drug users or people from socio-economically deprived areas, hence contributing to the broader disadvantage which these groups may suffer. Social narratives—such as those which determine the boundaries of ‘appropriate’ behaviour by pregnant women (eg, around light consumption of alcohol)—may cause stress and guilt even where their putative health rationales receive limited support from the evidence.<sup>36</sup> Such narratives may also lead people to reject public health messages as irrelevant to them, for example, by perpetuating stereotypes of particular health risks as associated with lower or marginal status. Finally, the broader impacts of ‘medicalisation’, for example, of mental health problems, on social norms, should also be borne in mind as a potential adverse effect of preventive programmes.<sup>37</sup>

## OPPORTUNITY COST HARMS

A final category of potential harms relates to the opportunity costs of interventions, that is, the potential benefits which may be forgone as a result of committing resources to ineffective or less effective interventions, or to less serious public health problems. Such opportunity harms cannot be precisely defined, since the counterfactuals on which they rest are imponderable by their nature, and are not limited to specific prioritisation scenarios. Nonetheless, from some perspectives such opportunity harms considerably outweigh the other categories of harms discussed above, and they should be considered in any discussion of adverse effects. Indeed, many of the other harms mentioned above—particularly in the context of large, costly intervention programmes (eg, health checks and media campaigns)—may also represent substantial opportunity cost harms.

## CONCLUSIONS

Whether intended or unintended, direct or indirect, interventions of any kind are likely to have wider effects than usually acknowledged by evaluators. For ethical and methodological reasons, it is imperative that the harmful effects of interventions are considered, collected and if possible alleviated by evaluators and designers of interventions. This paper has attempted to suggest categories which may be useful to diagnose and analyse types of unintended harms which may result from public health interventions.

The purpose of this paper is largely to stimulate debate and reflection, rather than to provide conclusive answers. It is not based on robust systematic review methods, and our use of the available data is selective. As already noted, many potential harms are not investigated in any depth in the empirical evaluation literature, and we have extrapolated from theory and qualitative data where necessary to fill these gaps; this should be borne in mind in interpreting the claims made in the paper. Some readers may consider some of our examples controversial or overstated, and it is true that most are probably not major systemic issues, with the possible exception of equity harms and, more debatably, opportunity harms. Nonetheless, there is good reason to think that all these types of harm may have substantial impacts in some cases.

Our framework suggests that many potential adverse effects may concern impacts which are diffuse and hard to measure—such as attitudes, emotional reactions, or social relationships or norms—rather than the more tractable health status or behavioural outcomes which are usually the focus of public health evaluation research. While evaluations should continue to consider the possibility of adverse effects on the latter type of outcome, a broader scope may be required to achieve a fuller understanding of the total impact of interventions. With the possible exception of equity harms,<sup>38</sup> a generalist ‘box-ticking’ approach to considering harms is unlikely to be of benefit. Rather, we would encourage researchers and practitioners to think as broadly as possible about the potential range of impacts before implementing or evaluating any intervention or policy. Our framework suggests that a wide range of preventive interventions may risk creating adverse harmful effects, and that their identification and measurement are a real gap in the literature.

## What is already known on this subject

- ▶ It is possible that public health interventions may sometimes create harms of various kinds.
- ▶ There is limited empirical data on the potential adverse effects of public health interventions, or theoretical discussion of what form such adverse effects might take.

## What this paper adds

- ▶ The potential harms of public health interventions can be classed into the following categories: direct harms; psychological harms; equity harms; group and social harms; and opportunity harms.
- ▶ Taking adverse effects into account will often require the inclusion of broader and less tangible impacts than those which form the focus of conventional outcome evaluations.

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