The IDEFICS intervention: what can we learn for public policy?

Garrath Williams

Affiliation: Department of Politics, Philosophy and Religion, Lancaster University, UK

Key words: intervention, evidence, policy, judgment

Running title: Policy implications of the IDEFICS intervention

Acknowledgements:
I would like to thank all my collaborators in the IDEFICS and I.Family projects, with special thanks to Faye Tucker, Lucia Reisch and Toomas Veidebaum. My thanks also to Artur Furtado, Lawrence Green, Amy McLellan, Hughes Ruault du Plessis, Carolyn Summerbell, Boyd Swinburn, Kristin Voigt, Sze Lin Yoong, and audiences at a workshop on 'Food Policy between Public Health and Ethical Pluralism' at Queen's University Belfast and at the ECO2015 and ISBNPA 2015 conferences. Further thanks to the editors and referees of this supplement. While this paper is indebted to many people's efforts and expertise, I should stress that the views presented here are my own. This work was done as part of the IDEFICS (www.idefics.eu) and I.Family studies (http://www.ifamilystudy.eu/). I gratefully acknowledge the financial support of the European Commission within the Sixth RTD Framework Programme Contract No. 016181 (FOOD) and the Seventh RTD Framework Programme Contract No. 266044. I am also grateful to the Federal Centre for Health Education, Germany, that financially supported the production of this supplement.

Address of corresponding author and e-mail address: Garrath Williams: Department of Politics, Philosophy and Religion, Lancaster University, Lancaster LA1 4YL, UK; g.d.williams@lancaster.ac.uk

Potential conflicts of interest: none

Abstract

Introduction: As considered in the rest of this volume, the effects of the IDEFICS intervention on obesity rates were not encouraging. This paper considers how far findings from the IDEFICS study and similar intervention studies are relevant to the policy process and political decision-making.

Methods: The paper offers theoretical and policy-level arguments concerning the evaluation of evidence and its implications for policy-making. The paper is divided into three parts. The first considers problems in the nature and applicability of evidence gained from school- and community-level obesity interventions. The second part considers whether such interventions present a model that policy-makers could implement. The third part considers how we should think about policy measures given the limited evidence we can obtain and the many different goals that public policy must take account of.

Results: The paper argues that: (1) there are clear reasons why we are not obtaining good evidence for effective school- and community-level interventions; (2) public policy is not in a good position to mandate larger-scale, long-term versions of these interventions; and (3) there are serious problems in obtaining 'evidence' for most public policy options, but this should not deter us from pursuing options which tackle systemic problems and have a good likelihood of delivering benefits on several dimensions.

Conclusion: Research on school- and community-level obesity interventions has not produced much evidence that is directly relevant to policy-making. Instead, it shows how difficult it is to affect obesity rates without changing wider social and economic factors. Public policy should focus on these.

Introduction

Other papers in this volume summarise the IDEFICS intervention and its effects over the relatively short period that it ran. In this paper, I offer some thoughts about the relevance of our work to the policy process. I will argue that the implications are indirect but significant. They point away from political efforts to 'scale up' these interventions, at least as standardly conceived. Instead, policy should focus on (what I will argue to be) its more proper responsibilities, the systemic and regulatory factors that underlie the rise in obesity rates. To avoid misunderstanding: this is not to disparage efforts at community organisation by those best-placed to contribute in this way. My aim here is to draw lessons for public *policy-making*.

In the first section of the paper, I point out some of the difficulties in creating knowledge about effective obesity interventions at the community level. The IDEFICS study belongs among an array of such intervention studies. Despite the conscientious efforts that have gone into these studies, their combined results are confusing and disappointing. I argue that this should not surprise us, given what such studies are attempting to do and to learn.

In the second section, I point out that there are also difficulties in the idea of 'scaling up' these interventions at the level of public policy. Community-level interventions involve the active collaboration of highly trained professionals, complex organisations, and local communities. The policy process is not well-placed to mandate such intensive cooperation, and is likely to bring about only diluted or even perverse attempts to intervene. We have no reason to expect worthwhile results from this.

In the final section, I suggest that public policy should focus elsewhere. Alongside our experience of other public health improvements, the mixed results of community intervention studies provide grounds for thinking that policy needs to tackle the systemic factors behind rising obesity rates. This is not easy, since these factors relate to many welcome social, economic and institutional changes – such as food plenty, comfortable and convenient transport, safe working conditions, and universal child education. Nonetheless, the systems that sustain these achievements rarely work as well as they ought, and have many unfortunate aspects – rising obesity rates included. A central responsibility of public policy is to govern these systems with all their effects in mind, without giving undue weight to economic or other interests.

I What sort of knowledge are we gaining from community-level intervention studies?

The IDEFICS study trialled a community-oriented intervention, working with schools, parents and local authorities to promote obesity-prevention messages, such as the importance of water, fruit and vegetable consumption, reducing TV watching (as a key sedentary behaviour), and ensuring adequate sleep time. Working in eight different regions across Europe, with different local resources, cultures and infrastructures, the intervention had to be adapted to local settings. Systemic and infrastructure changes were not possible within the scope of the intervention. However, the intervention did aim to foster changes to local settings, for example, in

food and drinking water provision, classroom resources, and playground facilities. More details on the intervention design can be found in (1).

While the IDEFICS study was unique in attempting to implement and compare a similar intervention across a range of European settings, the general form of community-level intervention is familiar and well-studied. In this section, I will raise some wider problems in creating evidence through interventions such as that tested in the IDEFICS study. As I will stress, such interventions may be quite diverse, both in scale and activities. But they share a common form in terms of their purposes and the channels by which they can intervene.

The literature on such interventions and their results is large, as is the literature reviewing this evidence. Hillier et al. count 'over 30 published reviews and meta-analyses on interventions… for childhood obesity prevention' between 2008 and 2011 (2). As Boyd Swinburn (3) notes, 'The number of reviews in the area is starting to outnumber the number of studies.' Indeed, there are now even 'reviews of reviews.' (4) The combined results, however, make for sober and inconclusive reading. I would summarise the state of play as follows:

Many different interventions have been attempted. Quite a few have been tested. Some have demonstrated benefits in terms of preventing obesity or behaviour change. Some have not. A minority of interventions have been rigorously evaluated, such that they provide robust evidence for (in)effectiveness in the trial setting. A few interventions have been well-described, such that other teams could attempt to implement a similar intervention again. Very few interventions have been evaluated in the years following their completion. Hardly any have been costed. Almost none have been retested at another time or place.

Given this situation, it is not surprising that overall assessments differ. Some authors are moderately optimistic, concluding that the overall trend is for well-designed, well-evaluated studies to show modest but worthwhile reductions in average body mass index (5-7). Other authors are more pessimistic, along the following lines: Since the studies and settings are so variegated, since the interventions involve so many different elements, since the behavioural changes and physiological effects obtained (if any) are so modest, and since their costs and longer-term effects are unknown, it is hard to feel that we have learned how to intervene (cost-)effectively (8,9). On this view, the conclusions to be drawn do not really go beyond those that might be reached by anyone familiar with the history of other public health interventions, such as smoking cessation, traffic injury reduction or workplace safety. Without infrastructural, institutional or legal measures, or unless the change required is very straightforward, measures to encourage individual-level behaviour change will show small and perhaps only temporary effects (10,11).

Against this background, the results of the IDEFICS study are disappointing but unsurprising. For the most part, the IDEFICS intervention did not show effects in terms of obesity prevention, although this partly depends on how one cuts the cake. (see (12,13)) However, the IDEFICS study did have two unambiguous findings. It showed that the behaviours targeted by the intervention are highly correlated with health-related outcomes such as weight status and other biomarkers. Equally, it showed that hardly any children's lives correspond to ideal patterns of health-related behaviours (14). In other words, we have strengthened the evidence that certain

behavioural patterns are better for healthy development and that most children's lives do not look like this. Unfortunately, we have also strengthened the evidence that it is hard to alter these patterns with a community-level intervention.

Given this disappointment, on top of mixed research findings, some reflection is called for. In the rest of this section I will focus on the problems of gaining knowledge in this area. These points are not novel. Similar problems have already been highlighted in the intervention literature in terms of the distinction between internal and external validity. Methods for judging the effectiveness of a specific intervention have become much more rigorous ('internal validity'). Despite a growing literature (15-22), however, methods for gauging whether that effectiveness is likely to be repeated when making a similar intervention in other settings ('external validity') are still in their infancy (23-28). (I should also cite parallel arguments by the philosopher Nancy Cartwright about the difficulty of knowing whether an intervention that works in one place is likely to work in another (29,30).) In the following section I will focus on the relevance of this evidence to decision-making at the policy level.

Let me begin by noting that there are problems in principle with the very idea of conducting the *same* intervention. These interventions are multidimensional – they use several available tools in order to alter several individual- and community-level factors that we have reasons to think will make a difference. The precise mix and nature of these tools is bound to differ between interventions, not just in terms of the external resources invested, but also the opportunities presented by a given community or setting. For example, parents may be more or less trusting of school authorities, depending on wider political and cultural factors as well as on previous local and individual experiences. We can be sure that this will alter how receptive parents are to measures mounted through schools; school-based measures may also have variable effects of their own on parents' trust in schools.

Further, the actual course of an intervention is bound to vary, the more responsive intervention leaders are to the opinions of stakeholders in the intervention region; likewise, the more intensive and multi-dimensional an intervention is. After all, we cannot make communities more similar to one another – that would be another sort of intervention that no one knows how to do, let alone has the authority for. Therefore a lot of the effort involved in a well-resourced, multi-stranded, long-term intervention goes into adjustment and integration – in a word, *cooperation* with community members and organisations who have their own ideas, resources, priorities and expertise. This dependence on local, contextual factors makes actual interventions highly particular – and that is to say: neither easily transferable nor straightforwardly comparable. In my view, Economos and Sliwa (31) badly understate the problem when they say, 'The need for research to generate broad recommendations can chafe against the necessity of tailoring interventions to community needs.'

One way to finesse this issue is to frame interventions in terms of specific purposes or processes, rather than the concrete activities by which they are delivered (32). To draw on my previous example: whether school staff are heavily involved in intervention measures should depend (*inter alia*) on how well they are trusted by parents. Using other, better trusted professionals might be seen as something to be decided in the process of developing the intervention, drawing on the expertise of local stakeholders, rather than as a different mode of intervention. These are surely

reasonable ways to theorise and compare interventions. Note, however, the high degree of abstraction involved in talking of purposes and processes. Prospectively, a great deal of background information and practical nous is needed to decide how to implement particular purposes in a particular setting. Looked at in retrospect, much information and judgment is needed to assess how well they were realised in a particular intervention. Without such information, we cannot understand the actual intervention as it emerged, or tell whether similar practical measures played similar causal and functional roles. Teacher-led initiatives might be engaging for parents in one community, and actively alienating in another. What starts as an apple in one place might turn out to be an orange (or a turkey!) in another.

Moreover, providing and assessing the relevant information is extremely difficult. As intervention researchers, we may *think* we know what we are doing. But since we are always reliant on many people's knowledge and cooperation, every actual intervention is a complex social process that far exceeds the intentions or actions of any particular actor. To give a proper account requires detailed, qualitative study of different organisations and stakeholders and communities across time. This involves a rather different sort of expertise than that involved in epidemiology, and few intervention teams have the resources to make the attempt.

The IDEFICS intervention illustrates these problems well. It was designed to allow for cultural and setting variation, while preserving a broad functional equivalence across ten specific action modules (for example, partnership building in the community, or environmental and policy changes related to fruit and vegetable consumption) (33,34). Inevitably, however, the interventions differed between regions in ways we did not and probably could not document. As a result, we simply cannot say why the IDEFICS intervention had some success in Tartu, Estonia, but not in the other regions where it was attempted. (As judged by change in body mass index z-scores and other body composition indicators (12).) We do not know enough about how the Estonian setting differed from the other settings, nor about how the IDEFICS intervention modules were implemented there, nor about how far this implementation really corresponded to the intervention design. Of course, if 'the' intervention had been successful in all regions, we might have some confidence about its transferability, and would have support for some hypotheses about its functional and causal pathways. But even then, we would not be able to isolate some aspects as more important to its effectiveness than others, nor would we have much basis for predicting those contexts in which it would be unlikely to succeed – the old problem of external validity.

But this is just one example of a broader issue. The wider scene is made up of different scientific and public health teams, with different resources, theories, personnel and priorities, who attempt different interventions in different communities, often while measuring outcomes in somewhat different ways. Despite long-standing calls to report factors bearing on external validity (35), the relevant differences are mostly undocumented (36). Calls for 'process evaluation' are responses to this lack of information, as are worries about the 'dose' or 'fidelity' of interventions. But as authors become more careful in specifying the complexity of intervention processes and the difficulties involved in assessing them, the standards of evidence they advocate become ever higher – to the point that one wonders if they could ever be realised (37,38). For example, as Flynn et al. (39) note, 'Few studies consider the

impact of the programme facilitator or leader on programme participation and outcomes; yet this can be a pivotal aspect of total programme performance.' We never hear who got on with whom, the personal qualities that were brought to bear, the dynamics that make some community groups cohesive and some organisations effective (or not!). Of course, no one likes to wash their dirty linen in public. And no doubt other teams may find themselves unable to repeat or avoid such personal and organisational dynamics. But this does not alter the fact that such factors may make a considerable difference – sometimes all the difference between success and failure.

This is one reason why the apparatus of 'evidence synthesis' and 'systematic review' does not serve us terribly well here (40-43). On top of substantial diversity in initial conditions, design, methods and implementation, and a lack of information about these, we now add the abstraction necessary for systematic review. Employing such broad categories as (say) 'Interventions in non-school settings targeting diet,' reviews barely digest the modest amount of qualitative information that we do have about different interventions. This is surely reason to fear that the rigours of these methodologies are not well-suited to our subject-matter. (It is also a major impetus behind recent calls for 'realist review' methods (44-46) and other, more complex frameworks for assessing evidence (38,47,48).) In any case, reviews cannot repair the original lack of information. The result is that no one is sufficiently well-informed to reach uncontroversial judgments about what is likely to work where or to work best in a given setting. And at the risk of labouring a point, let me emphasise that the 'where' is crucial: even an intervention works in one setting, it is not really possible to replicate 'the same' intervention in another setting, or to predict whether, if the attempt were made, it would have similar success.

In short, we cannot expect any multidimensional community-level intervention to demonstrate unambiguous long-term results, clear causal pathways, and transferability to different settings. Interventions depend on their contexts and effects are modest at best; to stand a chance of working, interventions require cooperation and tailoring which makes them still more specific; evidence synthesis tends to ignore this particularity, not least because the relevant information (about both context and process) is hard to document and rarely available. The many systematic reviews testify, often despite the authors' intentions, that the results of different intervention studies cannot be combined to overcome these problems. One may still conclude that a carefully designed and well-implemented intervention is, on balance, likely to achieve beneficial effects. But an enormous amount of experience, expertise, judgment and cooperation sits behind the words 'carefully designed and well-implemented' – not to mention a deal of plain luck. The bottom line is the difficulty of achieving substantial improvements using these tools: informational and educational measures, encouragement to behaviour change, community activities, and any other initiatives that do not depend on broader institutional, legal, economic and political change.

II How could this sort of knowledge be 'applied' at the policy level, and what should we expect if it were?

Readers committed to obesity intervention efforts may feel that I have overdone the problems of gaining knowledge. As mentioned, one may argue that careful analysis of our best studies shows that community-level interventions can have worthwhile

effects. Indeed, the IDEFICS intervention may invite such a response: the resources invested were relatively slight and the timeframe was short; nevertheless, if the results are analysed in a certain way (13) we see definite results – although it remains to be seen whether they will translate into meaningful long-term outcomes. One might also argue that before the jury returns, we need better-resourced, longer-term, more intensive, better-documented intervention studies – a common refrain in the systematic review literature (5,49,50).

At a policy level, however, I do not think such arguments provide grounds to pursue interventions of this type. In this section I will focus on one straightforward reason for this claim. Policy-makers are not well-placed to ensure that carefully designed and well-implemented community-level interventions take place. As several authors have noted, there is a significant mismatch between the measures that public policy can implement and the measures that researchers can initiate and assess (51,52). This is true whether we think about local or national policy-makers, never mind European or other international governance mechanisms. In addition, public policy must address a wide range of priorities – a point I will develop further in the next section. Initiatives that target one specific goal are rarely a good use of public resources, unless that goal is of overwhelming importance.

Let me begin by highlighting some problems in using schools as a major locus for intervention efforts, before generalising these points to the community level.

It is easy – perhaps too easy – to give reasons why schools are attractive sites for interventions on matters of major public concern. Almost all children go to school and spend a good deal of time there; children are the natural locus for preventative efforts; as we all know, prevention is better than cure. The problem starts with the fact that these considerations apply to almost any issue concerning the future of society, be it crime or illicit drugs or single parenting or sustainability or economic literacy or preventing extremism or… For all sorts of social problems – so the argument may go – lasting effects depend on addressing the persons who will make up our future societies. On further reflection, one might find this line of thought somewhat glib. As children grow up, they join in a society's systems and institutions; more than anything else, it is this framework that shapes both individual and collective ways of life. But glib arguments are often tempting and many different constituencies have petitioned schools to take on further responsibilities. However, schools already bear a very weighty responsibility: they address the future by fulfilling the vital task of educating the young. There is much room for debate about the relative priority of additional goals. Nonetheless, at the general level there should be agreement: however desirable, such goals need to be balanced alongside each other; and they must always remain secondary to the main purpose and responsibility of schooling.

This matters because the sort of multi-level interventions exemplified by the IDEFICS study asks schools to give specific priority to obesity prevention messages and activities. These interventions do not just consist of measures that can be unobtrusively incorporated into normal institutional running – providing drinking water and healthy food, decent playgrounds and play time, and so on. Indeed, such measures would be uncontroversial if they did not have financial and timetabling implications. Our concerted interventions ask schools to be much more active: to promote key messages, engage in specific activities and events, involve parents and so on. My point is twofold. First, we cannot really imagine this happening across

whole countries or in the long-term, given that schools already have a leading priority (education) and also face any number of other, potentially competing priorities. Second, this sort of active cooperation cannot really be mandated at the policy level, unlike some changes to normal institutional running. Indeed, it is easy to see that interventions would degenerate into tokenism if policy-makers attempted to enforce such cooperation from schools, teachers and parents (53).

A parallel set of arguments applies when we think about interventions in the wider community. Unlike schools, communities do not have a single or overarching responsibility: they must serve a plethora of different responsibilities and purposes. But this fact poses a similar difficulty for policies that aim to elicit cooperation around a particular priority. To do so across whole regions or nations would represent a disproportionate interference in day-to-day life. Indeed, it is hard to imagine the attempt. Even at local or municipal level, policy provisions can only remove obvious barriers, shift the balance of incentives and opportunities, provide funding, and exhort cooperation. A multi-stranded community intervention relies on willing cooperation from many groups, considerable expertise, and much commitment – all factors that are just as difficult to standardise as they are to document, and correspondingly difficult to mandate as matters of public policy. But without such cooperation, we will not have a 'scaled up' version of an obesity intervention, not even a diluted version of one. Again, the clear danger is tokenism: a few posters and billboards, some directives and targets, empty press releases and well-intentioned speeches (53). As with school-based measures, some elements of community interventions *can* be created by action at the policy level – for example, the promotion of safe urban environments and attractive green spaces. My point is just that public policy cannot create the sort of multilevel, synergistic community interventions under discussion here, especially when we think at regional or national scale.

Some readers may feel, once more, that I am over-egging the pudding. In particular, they might offer the example of EPODE as a factual refutation of my claims. EPODE is a community-level intervention implemented in over 200 French towns since 2004; it now has sister projects in other countries (54). In each case, a national office provides methods and materials and training to any town or local council that is willing to make certain core commitments, such as a minimum 4 year duration and paying a dedicated local coordinator. With the support of local political leaders, the coordinator builds cooperation among local stakeholders such as schools and community groups, in order to promulgate key messages around nutrition and physical activity to children and their families. (In practice, then, there are many similarities with the IDEFICS intervention, although this had a shorter timescale of only two years.) Additional funds for materials and events come from municipalities, health authorities or local sponsors, as well as four key national sponsors (Ferrero, Mars, Nestlé and Orangina Schweppes). While I do not doubt the expertise and commitment of those involved, I suggest that we should approach EPODE with caution at the policy level.

First, there is only weak evidence that the EPODE interventions have had or will have an impact on obesity rates. While EPODE coordinators are keenly aware of the need for evaluation data (55), so far this has not been forthcoming. Advocates of EPODE can, of course, point to the many difficulties for evaluation that I have raised in the first section of this article (56). From their point of view, these difficulties may count

as grounds for proceeding on the basis of weaker evidence. For example, they may suggest that other community social-marketing initiatives have been successful (57). Unfortunately, this is hardly a solid or unarguable finding – at best, it suggests that EPODE is worth trial. Or again, they may point to reduced rates of overweight and obesity seen in the two towns where the EPODE intervention was developed, as against a 'similar' town nearby (58). The difficulty, however, is the lack of longitudinal comparisons between any towns involved in EPODE and elsewhere – that is, we lack measurements such as body mass index taken from children at a series of time-points, showing how obesity rates altered in non-intervention towns. (Such comparisons represent a key strength of the IDEFICS study). For reasons discussed in the first section, such data would still leave room for argument and judgment. Without them, however, the purported comparison is weak indeed.

Second, it follows that EPODE involves the widespread adoption of an initiative on the basis of hope rather than evidence. And that fact invites us to ask why local politicians of all parties have found it attractive. (Sensibly enough, EPODE looks for cross-party support in each locale, to ensure that the intervention will not be dropped with a new election.) For the relatively small price of c. €28-31,000 per annum (59), politicians can sign up to a cause that no one will disagree with. Small commitments promise substantial returns. Yet no one can tell whether those promises are fulfilled. In the next section, I will argue that policy-makers must often proceed without firm evidence that a measure will be effective. But I will also argue that they ought to take account of a wide range of priorities when doing so. Poorly-evidenced measures that target a single goal have a low claim on policy-makers' attention.

To sum up my arguments so far: The methodological difficulties facing intervention studies are formidable. While the quality of intervention studies has continued to improve, the resulting evidence still does not meet vital desiderata of efficacy or external validity. On top of this, however good or bad it is, this evidence is not really of the type that we need to guide action at the policy level, since policy-makers are not in a good position to create larger-scale versions of this sort of intervention. The biggest attempt to do this (EPODE and allied initiatives) operates on the basis of much weaker evidence than that offered by the intervention research literature, and remains badly under-researched. If intervention studies were meant to provide a bridge from evidence to policy, then they have not lived up to their promise.

III Evidence, judgment and public policy

From a political point of view, school- and community-level interventions may seem attractive because they promise to tackle obesity while leaving institutions and infrastructures unchanged. Although these interventions make important demands on schools, parents and communities, they do not challenge vested interests and they do not require much political will. At the same time, we know that lasting remedies to other (non-communicable) public health issues required economic, organisational and systemic changes. This brings us back to problems of political will and vested interests. It points us back to the sphere of political decision-making, where – as I will now argue – evidence is just one factor to be weighed as part of broader judgment.

In saying this, I should acknowledge that problems of evidence apply to policies that tackle economic and social arrangements, as much as (if not more than) they apply to school- and community-level interventions. For most public policy options, it is hard

to know in advance whether they will do what we want. Even in retrospect, it is hard to judge whether they had the effects intended (60). The reasons for this mirror the problems I highlighted in section I. Our knowledge of the situation is incomplete; no social and economic situation is exactly like any other; any policy change is manifested as a complex social process; many other changes will be going on at the same time; most of these changes are hard to measure; causes and effects are difficult to disentangle. Take a straightforward policy like a tax on sweetened drinks. Two years on, consumption and even obesity rates may have dropped. But there might have been other causes for these reductions; even if the tax did cause them, its effectiveness might have depended on social or economic factors that do not hold elsewhere. We would also have to consider whether the tax had other effects, for better and worse. In short, we never compare like with like. So we will not get the indisputable causal evidence that scientists might hope for. Nor will we get the sort of foolproof causal lever that policy-makers might wish for.

This problem of evidence may make my position appear contradictory. I will continue to suggest that policy-makers should not focus on community-level interventions, at least not in the absence of serious commitments to systemic changes. This is partly because evidence for them is problematic and partly because it would be hard for public policy to recreate such efforts at large scale. But especially if you are not convinced by my suggestion that policy-makers cannot impose well-designed community-level interventions, you might wonder how consistent my argument is – how can I reject one policy option because evidence is weak, and advocate other possibilities for which evidence is also weak?

My response rests on the following thought. When formulating public policy, we must consider many different goals; evidence about how to achieve them will always be incomplete; where evidence is incomplete, we must use our judgment, not least by taking account of many goals at once.

Apart from the problems of evidence underlined above, a wider problem arises from the many goals of public policy. Good evidence can tell us how to achieve something *given certain starting conditions and resources*. Sometimes evidence may approach certainty; sometimes solid evidence is hard to find. Either way, there could never be enough evidence to tell us how to achieve everything that we want. When many goals are in question, as they always are in public policy, it is inevitable that they will point in different directions. That is, pursuing one goal disrupts the conditions or resources needed to achieve another. So however good it is, the evidence we have about how to achieve that other goal (or goals…) becomes less relevant and reliable.

This is where judgment comes in. Judgment weighs many different sources of information; it balances probabilities; it canvasses a wide range of possible responses. Judgment takes account of different priorities: not just rising obesity rates, but the many other difficulties and priorities that we face. (One of my favourite books on policy-making is entitled *The Art of Judgment* (61), and I draw on its key ideas here.) While this multiplicity of goals defeats simple hopes for ‘evidence-based’ public policy, it also enables a constructive response: to look for measures that are likely to make helpful contributions on many different fronts (62).

Alongside many other studies, our epidemiological findings in the IDEFICS study provide disturbing evidence for public policy. While the IDEFICS study focussed

specifically on obesity, I would emphasise that our results provide evidence for a broader range of problems. If our current wisdom on diet, physical activity, sedentary behaviour and sleep time is correct, then very few children are living in ways that are most conducive to future health – regardless of whether they are or will become obese (14). Scientific epidemiology does not just measure what is already visible: it also reveals what we would otherwise not see.

How we should interpret these facts is a matter of judgment. Let me suggest two complementary ways of interpreting them – not in order to convince you of either, but rather to indicate what I mean about public policy, multiple priorities, and the role of judgment.

First, these findings invite concern about the priority that our societies give to children's interests. Parents give enormous priority to their children's interests – probably increasingly so (63). And, as emphasised above, schools are dedicated to children's education. But children are not citizens; they are not workers; and their power as consumers is small. In general, our economies, organisations and built environments prioritise adult wants and interests. One effect of this is that powerful commercial forces can target children's desires and mould their appetites; another is that we increasingly fear to let children go anywhere without a 'responsible adult' to guide them (64). This increases pressures on parents to protect their children as best they can. It worsens social inequalities, because some parents are much better placed to safeguard their children than others. And protecting individual children often involves supervision and limitation, thus depriving children of freedom and responsibility (65).

Or second: Obesity, like several other health problems, is a side-effect of some obvious successes of modern societies – food plenty, economic systems organised to tempt consumers, pleasant suburbs, the private car, and so on. In general, we expect public policy to uphold these achievements. But their foundations are rapidly crumbling. Their public health costs are dwarfed by gathering crises of sustainability – resource depletion, waste generation, climate change, and more. Despite decades of warnings, inaction seems tenable partly because these systems have been so strikingly successful, insulating the citizens of richer countries on a day-to-day basis. Inaction also seems attractive because only systemic change could address so many problems and priorities at once. To act in the face of many different problems and priorities raises the difficulty of imagining different ways of organising our social and economic systems. We cannot rely on the security of evidence that tells us how to achieve a specific goal.

Of course, these are both complex nests of judgments that require much more discussion that I can offer here. I suggest them only to make two broader points. In the first place, it matters hugely how we frame an issue such as obesity prevention, and any adequate framing must acknowledge many other priorities. As a result, 'evidence' is necessarily a limited resource for public policy. Obesity is an obvious focus for concern because it is highly stigmatised and highly visible. Whether our societies give adequate weight to children's needs and experiences, how to deal with urgent problems of sustainability – I am suggesting that these are also matters for concern. Unlike obesity, however, they are not easily seen. They are to do with how we organise our societies and their material preconditions, matters that we mostly take for granted as we go about our daily business.

From one perspective, the fact that obesity can be seen as a side-effect of other successes might seem like a good argument for school- and community-level obesity interventions. We make a relatively minor adjustment, and leave wider systems untouched. I will not dwell further on my first reply to this point – that the systems have enormous ecological costs that are already long overdue for reckoning. But I do want to say a word more about a second reply, concerning a rather different use of the word 'sustainability.' Even if these interventions can be reliably effective, in order to reduce obesity rates at a societal level they would be need to be 'scaled up' and 'sustained' over the long-term. I have already commented on problems of scale. Wide-scale interventions are bound to be rather different versions of the interventions we are trialling, not merely diluted versions. The 'sustainability' of interventions poses analogous problems.

If we take the term literally, community interventions may remind us of a rigorous diet. A person might stick to it for a while, but is bound to fall off the wagon sooner or later. Unless circumstances have changed, the pounds are doomed to pile back on. The intensive cooperation involved in community-level interventions is like the collective equivalent of willpower: sustaining it requires resources, initiative, on-going commitment. Unlike a diet, however, we lack simple ways to know whether an intervention is working. So keeping up the effort will be especially hard.

Perhaps this is a tendentious way of looking at the matter. Arguably it would be fairer to think of 'sustainability,' not in terms of continuing, concerted, community activity around the goal of obesity prevention, nor in terms of lasting effects on the children who experienced it, but rather in terms of social results that endure well beyond the intervention period. In other words, interventions should aim to create a decisive shift in how community systems work – lasting changes in social norms, significant changes to environments and infrastructures (66). These are valuable aims, and there is surely a role for community-level strategies in changing norms and creating demand for more systematic changes. However, this suggestion involves a significant rethinking of intervention methods, purposes and evaluation criteria. Reduced obesity rates would still be one goal, but success would have to be measured in wider terms – a major methodological challenge. Moreover, to the extent that such changes would require significant resources and commitments, then we return to the broader perspective of public policy. That is, we need to ask what our other goals and priorities should be, and whether they can also be addressed this way, and what the opportunity costs of this option might be. It also remains an important task to research whether we can achieve such changes, perhaps through broader interventions that combine wider policies with community-level organisation (67).

In the meantime, we come back to questions of judgment. Given what we know about obesity, given our limited knowledge about obesity interventions and their limited effects, given what we know about progress with other public health problems, given the opportunities for meaningful intervention that are available at the policy level, given the many other matters that deserve our attention … – in the light of all these factors, the problem is to judge where public policy-making should devote attention, energy and resources. If policy-makers are to proceed without strong evidence that their efforts will have large or lasting effects, I suggest that they should look for options that promise (but not guarantee!) benefits in terms of several different goals. To give just one of endless possible examples: we might try to reestablish the sort of

communal safety *and* risk acceptance that would allow children to walk and cycle and play independently of adult supervision. We cannot prove that this would reduce obesity rates, but there are reasons to think that it will help. Just as important, such efforts can deliver other benefits: they should help children become more independent and responsible; they may relieve parents from increasing expectations to supervise their children; they can benefit adults who currently feel unsafe in public spaces; and so on. Such a policy can count as successful even if obesity rates remain unchanged (62).

These arguments do not prove that community-level interventions are necessarily misplaced. Reducing obesity rates in children is a worthwhile goal and we know that some careful interventions have had modest effects. In addition, such interventions may have other valuable effects. In terms of the issues I have just mentioned: they may indeed help to shift social norms, or improve public spaces in ways that deliver multiple benefits. Likewise, interventions might build public support for stronger public health policies, or at least make it harder to initiate policies that undermine obesity prevention efforts (68,69). These are all important considerations – especially for those who are active at a community level, and especially if one is pessimistic about the political likelihood of meaningful policy action. In this paper, however, I have emphasised the perspective and responsibilities of public policy. Here, I think the balance of arguments suggests that community-level interventions cannot substitute for attempts to alter wider systemic factors, and that school- and community-level measures should only represent an element within these.

Conclusion

Of course, the IDEFICS study is not the last word in terms of intervention research. Nonetheless, our findings cohere all too well with the disappointing picture presented by many studies and systematic reviews: in general, limited effects; in any case, hard to translate into public policy. Hence one of my pessimistic conclusions. Intervention studies do not provide a bridge from evidence to policy. With the benefit of hindsight, I think it is easy to see why this is, and why it might be hard to admit.

At a research level, school- and community-level interventions are attractive for two reasons. They address an important public concern; and they are easier to research than most other policy measures, because they can be initiated by researchers at a scale we can study. But the fact that interventions address an acknowledged public issue does not necessarily mean that the evidence generated can guide public policy (70). I have pointed to the difficulties of creating and maintaining such interventions through public policy. These difficulties are just the flipside of the fact that researchers can initiate interventions on the basis of support from communities and schools, with only modest endorsement from local policy-makers. Although I have not dwelt on the point, this may suggest a mismatch between researchers' priorities and policy needs, as well as a problematic view of the relation between research and policy (71,72). The implied picture is one where research proposes and investigates solutions; then policy implements these. Of course, researchers have good methodological reasons to prefer interventions they can control (if only to a limited degree, as stressed in the first part of this paper). From a policy perspective, however, it is often more helpful to have evaluations of interventions initiated at the policy level. We must still be cautious about the replicability of those interventions and the

transferability of the resulting evidence. But at least we can be sure of studying possible, practical policy measures. (As many readers will recognise, here I echo calls for more 'practice-based evidence' from Russell Glasgow, Lawrence Green and others (3,52,70,73,74), as well as Kelly Brownell and Christina Roberto's call (75) for 'strategic science with policy impact.')

From a political perspective – by which I mean: in the hope of satisfying as many societal goals and interests as well as can be – community interventions may seem like a way to have our cake and eat it. We retain the comforts and achievements of prosperous, (sub)urban societies, and adopt an 'intervention' regime to combat their unfortunate effects on our health and waistlines. Or from a rather different perspective: community interventions may look like the best we can do in the absence of serious policy change. Either way, however, such interventions require sustained will-power, collective commitment that is unlikely to last and cannot be imposed from on high. As mentioned in the previous section, there may be other ways of framing intervention aims, in terms of changing systems and social norms. I have not rejected these hopes – indeed, our cumulative experience with community-level interventions may provide grounds for this sort of rethinking. But this will need more ambitious collaborations than researchers can initiate, and require definite policy commitment. And we will have to wait and see, and indeed *research*, whether such hopes are realistic.

If community interventions are not combined with wider changes, though, long-term effects are unlikely and the responsibilities of public policy are ducked. Encouraging people to act in ways that their environment makes difficult is not very effective, nor is it really fair. Allow cars to dominate (sub)urban spaces, and then tell people they should walk and cycle. Maintain an economic system that nigh-on requires food and drink companies to aggressively market processed foods, and then tell children to eat whole foods and parents to feed them accordingly. Understood in this way, school- and community-level obesity interventions do not *simply* support parents and children. If thoughtfully designed and implemented, they surely do this – thus the high levels of approval that parents showed for the IDEFICS intervention (76). At the same time, however, community-level interventions also ask parents and children to avert risks that systems and infrastructures are imposing on them. Although individuals and communities have some responsibilities in this regard, this is primarily the responsibility of public policy (77,78). Like other school- and community-level obesity interventions, the IDEFICS study cannot answer these wider questions of policy and judgment. But it should call our attention to them.

References

[1] Pigeot I, Baranowski T, De Henauw S, the IDEFICS Intervention Study Group, on behalf of the IDEFICS consortium. The IDEFICS intervention trial to prevent childhood obesity: design and study methods. *Obes Rev* Suppl 2015; **??/?**: ??–??.

[2] Hillier F, Pedley C, Summerbell C. Evidence base for primary prevention of obesity in children and adolescents. *Bundesgesundheitsblatt Gesundheitsforschung Gesundheitsschutz* 2011; **54**: 259-264.

[3] Swinburn B. Evidence framework for childhood obesity prevention. In: Waters E, Swinburn B, Seidell J, Uauy R (eds). *Preventing childhood obesity: evidence, policy and practice*. Wiley-Blackwell: Chichester, 2010, pp 49-56.

[4] Brand T, Pischke CR, Steenbock B *et al*. What works in community-based interventions promoting physical activity and healthy eating? A review of reviews. *Int J Environ Res Public Health* 2014; **11**: 5866-5888.

[5] Waters E, de Silva-Sanigorski A, Hall BJ *et al*. Interventions for preventing obesity in children (review). *Cochrane Database Syst Rev* 2011; **12**: CD001871.

[6] da Silveira JAC, Taddei JAAC, Guerra PH, Nobre MRC. The effect of participation in school-based nutrition education interventions on body mass index: a meta-analysis of randomized controlled community trials. *Prev Med* 2013; **56**: 237-243.

[7] Lavelle HV, Mackay DF, Pell JP. Systematic review and meta-analysis of school-based interventions to reduce body mass index. *J Public Health* 2012; **34**: 360-369.

[8] Haynos AF, O'Donohue WT. Universal childhood and adolescent obesity prevention programs: review and critical analysis. *Clin Psychol Rev* 2012; **32**: 383-399.

[9] Bleich SN, Segal J, Wu Y, Wilson R, Wang Y. A systematic review of community-based childhood obesity prevention studies. *Pediatrics* 2013; **132**: e201-e210.

[10] Walls HL, Peeters A, Proietto J, McNeil JJ. Public health campaigns and obesity – a critique. *BMC Public Health* 2011; **11**: 136.

[11] Gielen AC, Green LW. The impact of policy, environmental, and educational interventions: a synthesis of the evidence from two public health success stories. *Health Educ Behav* Suppl 2015; **42/1**: 20S-34S.

[12] De Henauw S, Huybrechts I, De Bourdeaudhuij I *et al.*, on behalf of the IDEFICS consortium. Effects of a community-oriented obesity prevention programme on indicators of body fatness in preschool and primary school children. Main results from the IDEFICS study. *Obes Rev* Suppl 2015; **??/?**: ??-??.

[13] Lissner L, De Bourdeaudhuij I, Konstabel K *et al.*, on behalf of the IDEFICS consortium. Differential outcome of the IDEFICS intervention in overweight versus non-overweight children. Did we achieve "primary" or "secondary" prevention? *Obes Rev* Suppl 2015; **??/?**: ??-??.

[14] Kovács E, Hunsberger M, Reisch L *et al.*, on behalf of the IDEFICS consortium. Adherence to combined lifestyle factors and their contribution to obesity in the IDEFICS study. *Obes Rev* Suppl 2015; **??/?**: ??-??.

[15] Nutbeam D. Evaluating health promotion – progress, problems and solutions, *Health Promot Int* 1998: **13**: 27-44.

[16] Green LW. From research to 'best practice' in other settings and populations. *Am J Health Behav* 2001; **25**: 165-178.

[17] Glasgow RE, Klesges LM, Dzewaltowski DA, Bull SS, Estabrooks P. The future of health behavior change research: what is needed to improve translation of research into health promotion practice? *Ann Behav Med* 2004; **27**: 3-12.

[18] Green LW, Glasgow RE. Evaluating the relevance, generalization, and applicability of research: issues in external validation and translation methodology. *Eval Health Prof* 2006; **29**: 126-153.

[19] Glasgow RE, Green LW, Klesges LM *et al*. External validity: we need to do more. *Ann Behav Med* 2006; **31**: 105-108.

[20] Sanson-Fisher RW, Bonevski B, Green LW, D'Este C. Limitations of the randomized controlled trial in evaluating population-based health interventions. *Am J Prev Med* 2007; **33**: 155-161.

[21] Klesges LM, Dzewaltowski DA, Glasgow RE. Review of external validity reporting in childhood obesity prevention research. *Am J Prev Med* 2008; **34**: 216-223.

[22] Thorpe KE, Zwarenstein M, Oxman AD *et al*. A pragmatic-explanatory continuum indicator summary (PRECIS): a tool to help trial designers. *J Clin Epidemiol* 2009; **62**: 464-475.

[23] Klesges LM, Williams NA, Davis KS, Buscemi J, Kitzmann KM. External validity reporting in behavioral treatment of childhood obesity. *Am J Prev Med* 2012; **42**: 185-192.

[24] Brownson RC, Diez Roux AV, Swartz K. Commentary: generating rigorous evidence for public health: the need for new thinking to improve research and practice. *Annu Rev Public Health* 2014; **35**: 1-7.

[25] Partridge SR, Juan SJH, McGeechan K, Bauman A, Allman-Farinelli M. Poor quality of external validity reporting limits generalizability of overweight and/or obesity lifestyle prevention interventions in young adults: a systematic review. *Obes Rev* 2015; **16**: 13-31.

[26] Yoong SL, Wolfenden L, Clinton-McHarg T *et al*. Exploring the pragmatic and explanatory study design on outcomes of systematic reviews of public health interventions: a case study on obesity prevention trials. *J Public Health* 2014; **36**: 170-176.

[27] Riley BL, MacDonald J, Mansi O *et al*. Is reporting on interventions a weak link in understanding how and why they work? A preliminary exploration using community heart health exemplars. *Implementation Sci* 2008; **3**: 27.

[28] Hoffmann TC, Glasziou PP, Boutron I *et al*. Better reporting of interventions: template for intervention description and replication (TIDieR) checklist and guide. *BMJ* 2014; **348**: g1687.

[29] Cartwright N. Knowing what we are talking about: why evidence doesn't always travel. *Evid Policy* 2013; **9**: 97-112.

[30] Cartwright N. Predicting what will happen when we act. What counts for warrant? *Prev Med* 2011; **53**: 221-224.

[31] Economos C, Sliwa SA. Community interventions. In: Cawley J (ed). *The Oxford handbook of the social science of obesity*. Oxford University Press: Oxford, 2011, pp 713-740.

[32] Hawe P, Shiell A, Riley T. Complex interventions: how 'out of control' can a randomised controlled trial be? *BMJ* 2004; **328**: 1561-1563.

[33] Verbestel V, De Henauw S, Maes L *et al*. Using the intervention mapping protocol to develop a community-based intervention for the prevention of childhood obesity in a multi-centre European project: the IDEFICS intervention. *Int J Behav Nutr Phys Act* 2011; **8**: 82.

[34] De Henauw S, Verbestel V, Mårild S *et al.*, on behalf of the IDEFICS consortium. The IDEFICS community-oriented intervention programme: a new model for childhood obesity prevention in Europe? *Int J Obes* Suppl 2011; **35/1**: S16-S23.

[35] Glasgow RE, Vogt TM, Boles SM. Evaluating the public health impact of health promotion interventions: the RE-AIM framework. *Am J Public Health* 1999; **89**: 1322-1327.

[36] Compernolle S, De Cocker K, Lakerveld J *et al*. A RE-AIM evaluation of evidence-based multi-level interventions to improve obesity-related behaviours in adults: a systematic review. *Int J Behav Nutr Phys Act* 2014; **11**: 147.

[37] Baranowski T, Cerin E, Baranowski J. Steps in the design, development and formative evaluation of obesity prevention-related behavior change trials. *Int J Behav Nutr Phys Act* 2009; **6**: 6.

[38] Institute of Medicine. *Bridging the evidence gap in obesity prevention: A framework to inform decision making*. National Academies Press: Washington DC, 2010.

[39] Flynn M, McNeil DA, Maloff B *et al*. Reducing obesity and related chronic disease risk in children and youth: a synthesis of evidence with "best practice" recommendations. *Obes Rev* Suppl 2006; **7/1**: 7-66.

[40] Petticrew M. Why certain systematic reviews reach uncertain conclusions. *BMJ* 2003; **326**: 756-758.

[41] Petticrew M, Anderson L, Elder R *et al*. Complex interventions and their implications for systematic reviews: a pragmatic approach. *J Clin Epidemiol* 2013; **66**: 1209-1214.

[42] Petticrew M. Time to rethink the systematic review catechism? Moving from 'what works' to 'what happens.' *Syst Rev* 2015; **4**: 36.

[43] Glasby J. From evidence-based to knowledge-based policy and practice. In: Glasby J (ed). *Evidence, policy and practice: critical perspectives in health and social care*. Policy Press: Bristol, 2011, pp 85-98.

[44] Pawson R. *Evidence based policy: a realist perspective*. Sage Publications: London, 2006.

[45] Pawson R, Greenhalgh T, Harvey G, Walshe K. Realist review – a new method of systematic review designed for complex policy interventions. *J Health Serv Res Policy* Suppl 2005; **10/1**: 21-34.

[46] Wong G, Greenhalgh T, Westhorp G, Buckingham J, Pawson R. RAMESES publication standards: realist syntheses. *BMC Med* 2013; **11**: 21.

[47] Chatterji M, Green LW, Kumanyika SK. L.E.A.D.: a framework for evidence gathering and use for the prevention of obesity and other complex public health problems. *Health Educ Behav* 2014; **41**: 85-99.

[48] P Craig P, Dieppe P, Macintyre S, Michie S, Nazareth I, Petticrew M. Developing and evaluating complex interventions: an introduction to the new Medical Research Council guidance. In: Killoran A, Kelly MP (eds). *Evidence-based public health: effectiveness and efficiency*. Oxford University Press: Oxford, 2009, pp 185-202.

[49] Hillier-Brown FC, Bambra CL, Cairns J-M, Kasim A, Moore HJ, Summerbell CD. A systematic review of the effectiveness of individual, community and societal level interventions at reducing socioeconomic inequalities in obesity amongst children. *BMC Public Health* 2014; **14**: 834.

[50] Kamath CC, Vickers KS, Ehrlich A *et al*. Behavioral interventions to prevent childhood obesity: a systematic review and metaanalyses of randomized trials. *J Clin Endocr Metab* 2008; **93**: 4606-4615.

[51] Nutbeam D. Achieving 'best practice' in health promotion: improving the fit between research and practice. *Health Educ Res* 1996; **11**: 317-326.

[52] Green LW, Glasgow RE, Atkins D, Stange K. Making evidence from research more relevant, useful, and actionable in policy, program planning, and practice. *Am J Prev Med* Suppl 2009; **37/1**: S187-S191.

[53] Gard M, Vander Schee C. The obvious solution. In: Gard M. *The end of the obesity epidemic*. Routledge: Abington, 2011, pp 82-107.

[54] Borys J-M, Le Bodo Y, Jebb SA *et al*. EPODE approach for childhood obesity prevention: methods, progress and international development. *Obes Rev* 2011; **13**: 299-315.

[55] Pettigrew S, Borys J-M, Ruault du Plessis H *et al*. Process evaluation outcomes from a global child obesity prevention intervention. *BMC Public Health* 2014; **14**: 757.

[56] van Koperen M, Visscher TLS, Seidell JC. Scientific evaluation and dissemination. In: Borys J-M, Le Bodo Y, De Henauw S *et al.* (eds). *Preventing childhood obesity: Epode European Network recommendations*. Lavoisier: Cachan cedex, 2011, pp 145-179. http://www.epode-european-network.com/images/stories/EEN_Recommendations.pdf

[57] Gracia-Marco L, Vicente-Rodríguez G, Borys J-M, Le Bodo Y, Pettigrew S, Moreno LA. Contribution of social marketing strategies to community-based obesity prevention programmes in children. *Int J Obes* 2010: **35**: 472-479.

[58] Romon M, Lommez A, Tafflet M *et al*. Downward trends in the prevalence of childhood overweight in the setting of 12-year school- and community-based programmes. *Public Health Nutr* 2008; **12**: 1735-1742.

[59] Alam T, Romon M. Public-private partnerships. In: Borys J-M, Le Bodo Y, De Henauw S *et al.* (eds). *Preventing childhood obesity: Epode European Network recommendations*. Laviosier: Cachan cedex, 2011, pp 121-144. http://www.epode-european-network.com/images/stories/EEN_Recommendations.pdf

[60] Lieberman LD, Earp JAL (eds). *The evidence for policy and environmental approaches to promoting health*. Special issue of *Health Educ Behav* Suppl 2015; **42/1**.

[61] Vickers G. *The art of judgment: a study of policy-making*. Chapman & Hall: London, 1965.

[62] Voigt K, Nicholls SG, Williams G. *Childhood obesity: ethical and policy issues*. Oxford University Press: New York, 2014.

[63] Alstott A. *No exit: what parents owe their children and what society owes parents*. Oxford University Press: New York, 2004.

[64] Shaw B, Watson B, Frauendienst B, Redecker A, Jones T, with Hillman M. *Children's independent mobility: a comparative study in England and Germany (1971-2010)*. Policy Studies Institute: London, 2012.

[65] Furedi F. *Paranoid parenting: why ignoring the experts may be best for your child*. Chicago Review Press: Chicago, 2002.

[66] Hawe P, Shiell A, Riley T. Theorising interventions as events in systems. *Am J Community Psychol* 2009; **43**: 267-276.

[67] Swinburn B, Malakellis M, Moodie M *et al*. Large reductions in child overweight and obesity in intervention and comparison communities 3 years after a community project. *Pediatr Obes* 2013; **9**: 455-462.

[68] Trickett EJ, Beehler S, Deutsch C *et al*. Advancing the science of community-level interventions. *Am J Public Health* 2011; **101**: 1410-1419.

[69] Institute of Medicine. *An integrated framework for assessing the value of community-based prevention*. National Academies Press: Washington DC, 2012.

[70] Lobstein T. Comment: preventing child obesity – an art and a science. *Obes Rev* Suppl 2006; **7/1**: 1-5.

[71] Robinson T, Sirard JR. Preventing childhood obesity: a solution-oriented research paradigm. *Am J Prev Med* 2005; **28**: 194-201.

[72] Klein R. Evidence and policy: interpreting the Delphic oracle. *J R Soc Med* 2003; **96**: 429-431.

[73] Glasgow RE, Lichtenstein E, Marcus AC. Why don't we see more translation of health promotion research to practice? Rethinking the efficacy-to-effectiveness transition. *Am J Health Behav* 2003; **93**: 1261-1267.

[74] Green LW. Public health asks of systems science: to advance our evidence-based practice, can you help us get more practice-based evidence? *Am J Public Health* 2006; **96**: 406-409.

[75] Brownell KD, Roberto CA. Strategic science with policy impact. *Lancet* 2015; **385**: 2445-2446.

[76] Nicholls SG, Pohlabeln H, De Bourdeaudhuij I *et al.*, on behalf of the IDEFICS consortium. Parents' evaluation of the IDEFICS intervention: an analysis focussing on socio-economic factors, child's weight status, and intervention exposure. *Obes Rev* Suppl 2015; **??/?**: ??-??.

[77] Schwartz MB, Brownell KD. Actions necessary to prevent childhood obesity: creating the climate for change. *J Law Med Ethics* 2007; **35**: 78-89.

[78] Roberto CA, Swinburn B, Hawkes C *et al*. Patchy progress on obesity prevention: emerging examples, entrenched barriers, and new thinking. *Lancet* 2015; **385**: 2400-2409.