ABSTRACT

Animal use in medical research is widely accepted on the basis that it may help to save human lives and improve their quality. Recently, however, objections have been made specifically to the use of animals in scientific investigation of human obesity. This paper discusses two arguments for the view that this form of animal use, unlike some other forms of animal-based medical research, cannot be defended. The first argument leans heavily on the notion that people themselves are responsible for developing obesity and so-called ‘lifestyle’ diseases; the second involves the claim that animal studies of obesity’s causes and therapies distract attention from preventive efforts. Drawing on both empirical data and moral reasoning, we argue that the relevant attributions of responsibility and claims about distraction are not plausible, and that therefore there is no reason to single out the use of animals in obesity research as especially problematic.

INTRODUCTION

The use of laboratory animals has been controversial throughout the history of modern biomedical research. Its opponents very often criticize animal experimentation on the grounds that it causes pain and other kinds of harm to the animals involved, but they have also questioned the benefit of the research. To date the opponents have not been successful in persuading the public that animal experiments should be banned. Recently, however, anti-experimentation pressure led to political initiatives aimed at phasing out the use of animals in cosmetic testing. These initiatives appeared first in the UK – arguably a pioneering country with regard to strict regulation of animal experimentation – and then spread out to all of the other EU member states.
More recently, criticism of animal use in medical research has focused specifically on the study of so-called lifestyle-related diseases[1]. The label ‘lifestyle-related’ is applied in medical and health promotion literature to health complaints whose development is linked with the way people live. It has been used to describe a number of serious non-infectious diseases, including obesity, type II diabetes, cardio-vascular disease, and some forms of cancer – diseases that are on the increase both in the developed and developing world[2]. The label is associated with the idea that those who have lifestyle diseases are in some degree responsible for their condition[3].

This has been noticed by opponents of animal research, and claims that animals should not be used in the study of lifestyle-related disease are now appearing in papers, reports, books and commentary[1,4-6], and on the websites of animal protection organizations. Presumably as a consequence of this, a committee appointed by the UK government to evaluate cost-benefit assessment procedures used in animal research also considered whether legal restrictions should be put on animal-based research into lifestyle-related diseases[7].

The fact that a government-appointed committee is addressing the ‘lifestyle’ argument suggests that the moral concerns underlying the argument are beginning to take root among mainstream stakeholders and perhaps more widely with the public as a whole. We believe the time has come, therefore, to look closely at the arguments against the use of animals in research into lifestyle-related disease.

We shall focus on just one lifestyle-related condition: obesity. The popular belief that obesity is caused by lifestyle habits which are in turn a consequence of individual lack of willpower[8-9] makes research with animals aimed at understanding and curing obesity an obvious target. And as has been argued elsewhere, it is important for the competing stakeholders in the animal research
debate (e.g. anti-vivisectionists, medical researchers and politicians) to be able to claim public support[10].

In our view, three arguments for the claim that obesity-related animal research is ethically unacceptable can be identified[1,4-6]: these centre on personal responsibility, distraction and invalid results. We concentrate on the first two of these. Very briefly, the invalid results complaint is that the multifactorial nature of obesity makes animal experiments a scientifically inappropriate route of inquiry[6]. True, it is not difficult to think of research questions for which animal studies are unlikely to be a useful tool – e.g. the issue whether, and how, exposure to advertising affect eating habits. But in our view this does not mean that animal studies cannot deliver important information about other factors in obesity or clues to new treatments. It is only, for instance, through controlled experiments which cannot be carried out with human patients that it is possible to establish whether various diet regimes modulate the risk of obesity. A recent animal model revealed the importance of the composition of gut microbiota in obesity in mice[11]; this result then encouraged others to conduct human trials[12]. Basic research into the complex mechanisms of appetite regulation is also highly dependent on animal models in which brain experiments can be conducted[13]. On the other hand, there is an on-going general debate about the validity of animal models[14-15]. Given these complexities, we have set the third objection to animal experimentation to one side: it raises issues that cannot be adequately addressed, let alone resolved, in a paper of this length.

Thus, in the remaining part of the paper we look in depth at the responsibility and the distraction argument.
1. The Responsibility Argument

The key claim in the Responsibility argument is the assertion that human beings are responsible for the obesity problem. Rosser[5] links lifestyle factors such as low consumption of vegetables and fruit and insufficient physical activity to the high prevalence of overweight and obese individuals in Australia. This situation, according to Rosser,

...makes it very difficult to justify animal experiments to cure ailments that we are often guilty of causing ourselves[5].

Similarly, Bekoff[4] comments on an animal study exploring human obesity and diabetes:

The monkeys shouldn’t have to pay for our indiscretions and poor choices[4]

Let us reconstruct this argument. It begins with the premise: (1a) Obesity is, in the moral (as opposed to merely causal) sense, self-inflicted and therefore the responsibility of the sufferer. It then seems to invoke a further ethical premise of the following sort: (1b) If people are responsible for their own health problems, it is ethically objectionable to use animals in research designed to solve these problems. We review both premises below.

(1a) Responsibility

Since there is a wide consensus these days, in the scientific community, that biological susceptibility, together with an obesogenic environment and its lifestyle counterpart at an individual level, causes obesity, it is also commonly accepted that there would be a decrease in the
prevalence of obesity if people changed their lifestyle and/or if societal structures were changed so as to limit obesogenic environmental effects[2,16]. However, the crucial issue for the Responsibility argument is not whether such changes would be effective, but rather whether responsibility in a morally relevant sense can be ascribed. Here, it may be relevant to distinguish between responsibility at societal level and responsibility at individual level.

At societal level, large-scale developments in the external environment have contributed historically, and continue to contribute, to the obesity epidemic in two ways: individuals have been exposed to ever-larger and easier-to-obtain calorific intake by changes in the global food system, and they have been encouraged to adopt sedentary lifestyles by increased mechanization and motorization[16]. At the same time it is generally assumed that key actors – primarily politicians and various groups of professionals – must take action if the epidemic is to be fought successfully[17]. However, it seems problematic to dismiss obesity-related animal research on this basis. Assigning the morally relevant responsibility to society here would be at best problematic, because in complex and global societal systems there is no single power centre controlling what happens on the ground – e.g. regarding human nutrition. The impacts of society, to the extent that these can be traced, are largely multi-centred, very often unanticipated, and only to a limited degree controllable. This implies that although ‘society’ may be held morally responsible, most obese individuals still cannot be held responsible for living in the present obesogenic environment. This suggests, then, that the focus of the Responsibility argument must be on responsibility at the individual level, to which we now turn.

A look into the literature presenting evidence on the aetiology of obesity shows that many of the factors associated with obesity are not very closely linked with individual conduct. First, biological
factors such as genetic predisposition, infectious agents, gender, and aging, cannot be attributed
to human sources at all[16]. Secondly, mounting evidence suggests that various kinds of
environmental exposure early in life increase the risk of developing obesity later in life. Examples
are maternal factors such as pre-pregnancy body weight, weight gain during pregnancy, smoking
during pregnancy, the initiation and duration of breast feeding, and possibly the composition of
complementary feeding during infancy[18]. Additionally, an important pathway to obesity from
environmental exposure runs through epigenetic processes that affect the expression of key genes
leading to the development of obesity. Such epigenetic effects may originate in the foetal
environment[19].

It appears unwarranted to hold the individual responsible for biological circumstances or for what
has an origin in his or her childhood or even before he or she was born.

Even if we accept that food choices, eating, and habits of physical activity, may play a role in
inducing obesity, it remains questionable to what extent it can sensibly be claimed that individuals
are personally responsible for how they act here. Below the surface sociological and biological
factors are very often in play.

Starting with the former, sociological insights have established that individuals are born into
different ‘lifestyle segments’ and tend to reproduce the habitual and cultural characteristics of
these, including eating habits[20]. Consequently, some people are, so to speak, socio-
psychologically disposed to the leading of ‘unhealthy’ lifestyles, and this may in turn encourage
obesity. Give this, even though it may be possible to ascribe some causes of obesity to human
sources (parents, peers, and societal structures), obesity in these cases stems from socio-
structural mechanisms that tend to reproduce habits, world views, and attitudes. Prospective
studies support this assumption; they show that indicators of socio economic status in the
childhood home are inversely associated with obesity in adulthood[21].

Developments in the body’s own weight-regulation mechanism can also make it difficult for the
individual to escape certain obesogenic factors. Thus, although obesity is essentially an
accumulation of excess energy as a result of a long-standing positive energy balance, it does not
follow that the individual could have prevented that accumulation by choosing to keep the intake
and expenditure of energy under better control. The body ordinarily regulates fluctuations in
physical activity and energy intake, and in this way it returns the individual to his or her original
bodyweight after deviation. However, it is known that, in individuals gaining weight, the level at
which this weight regulation operates is re-set, and the bodyweight equilibrium increases. The
accumulation of fat that takes place during development of obesity is on average so tiny (often
less than 1% of the total energy turnover) that the excess of energy intake over expenditure is
unobservable on a daily or weekly basis, technically as well as by the individual[22]. It is even
theoretically possible that, under certain conditions, weight gain is self-promoting [22].

At the same time the obese, and individuals gaining in weight, may be as hungry as the non-obese,
simply because their bodies do not sense that there is considerable excess energy available in their
adipose tissue[23]. When feedback signals from the body like satiety and the urge to use energy
are impaired it becomes increasingly difficult to prevent weight gain.

Owing to societal or physical circumstances, individuals in some subgroups may find it very hard,
or practically impossible, to make prescribed changes to their conduct. For instance, non-fattening
food may not be readily available to everybody, across nation-states, globally speaking. A
subgroup of the obese cannot make the necessary changes in physical activity, because they have
bodily impairments such as rheumatism and permanent injuries. It is also well-known that some individuals gain weight following the intake of medicines for diseases that are beyond their personal control[24].

To conclude: although some instances of obesity may be caused by lack of ‘willpower’ and to that extent support the Responsibility argument, this lack certainly does not account for most instances of obesity. Therefore, premise (1a) of the Responsibility argument is highly contestable.

(1b) If responsibility, no justification of animal use

Even if it could be shown that all obese individuals were responsible for their condition, the idea that people should not expect support from others (including support based on animal experiments) in cases where their problems are self-inflicted has far-reaching implications.

Thus, many injuries and diseases can be attributed to individual decisions. For example, injuries and illnesses may emerge as a consequence of the pursuit of extreme sports, such as off-piste skiing and mountaineering. Work-related diseases like stress may appear as a consequence of excessive workload, and in situations of this kind the source of ‘responsibility’ may be individual (personal ambitions) or organizational (lack of managerial responsiveness to psycho-somatic issues).

It is therefore problematic to single out obesity among the many health impairments that can be viewed as self-inflicted. Admittedly, animal studies relating to some allegedly self-afflicted health-problems – notably those linked with smoking and alcohol – have been criticized, and in some countries the use of animals in tobacco research is now banned. However, even in countries
where animal studies involving tobacco smoking are outlawed there is still no ban on the use of animals in scientific investigation of the diseases caused by smoking.

A ban on animal research into obesity, but not other allegedly self-inflicted health problems like those caused by tobacco and alcohol, could therefore be vulnerable to the charge of double standards, and specifically to the allegation that obesity sufferers are being treated less well than others.

2. The Distraction Argument

The Distraction argument takes as its starting point the observation that unhealthy habits, and particularly those associated with obesity, are largely preventable. It says that, given this, the focus should be on preventive measures inhibiting the habits in individuals that lead to weight gain. Animal-based research into ways of treating obese people tends, however, to move the focus away from preventive efforts. According to opponents, it therefore serves as

...a distraction from the real socio-economic, dietary and lifestyle issues that we need to address on a global scale[5].

The Distraction argument appears to require three premises. (2a) Research designed to develop cures, or therapeutic responses, to lifestyle diseases, including animal studies, shifts attention and resources away from prevention. (2b) All the problems related to obesity and other lifestyle-related conditions (‘the real... issues’) can be handled through preventive strategies. (2c) It is wrong to spend resources on animal studies of obesity if doing so will shift attention and resources
away from programmes that may effectively handle the problems of obesity. We can now review these premises.

(2a) Distraction

We conducted a literature search in PubMed (13 December, 2012) to check the empirical claim that a focus on treatment distracts attention and resources from prevention. Four relevant MeSH terms (diet therapy, drug therapy, prevention and control, and surgery) were used to examine the relative development of research directions linked with obesity. The results were assessed in terms of publication activity over the period we defined: primo 1995 – ultimo 2010. All article categories given by PubMed (e.g. Clinical Trials, Reviews, Case Reports) were included (see Table 1). It should also be noted that the table does not take into account that publications may have included more than one of the four MeSH terms reported. Had we adjusted for this, the total number of relevant publications would have been reduced by 5% from 21 110 to 20 133 hits.

INSERT TABLE 1 AROUND HERE

The table does not estimate differences in the allocation of financial resources. Thus average costs per study may differ across the identified four research directions. Furthermore, therapeutic studies conducted in laboratories and research centres outside the public sector are probably underrepresented. These factors could have changed the picture, leading to a greater emphasis on treatment research. Despite these limitations, it can be seen that the largest single proportion of
the studies (36.5%) fall into the category ‘Prevention and Control’. It can also be seen that the trend over the period is very clear. All of the types of study have grown in frequency. And the fact that papers on ‘Prevention and control’ have been, and are, growing in frequency, together with the further fact that this category has grown more rapidly than the other research directions (with almost a tenfold increase between 1995-1998 and 2007-2010) suggests there is little support for (2a), the Distraction premise.

(2b) Efficacy of prevention

We turn now to the second premise of the Distraction argument. Is it correct to claim that prevention has the capacity to solve the obesity problem on its own? If it is, premise (2b) could form the basis of an argument favouring a redirection of resources to prevention.

However, it is highly doubtful that prevention on its own would solve the obesity problem. Prevention may be an effective tool in controlling factors associated with individual conduct. Preventive efforts can to some extent also contain and keep in check some of the causes in the individual’s surroundings — e.g. it might affect expectant mothers’ tendency to smoke, or unhealthy eating habits in the parental household. However, it remains to be shown that any of these efforts targeting human conduct would in fact work effectively and consistently over time. Much more research is needed (and is being conducted) into finding ways to effectively prevent obesity.

Moreover, even if it were possible to counteract the causes of obesity, and thereby prevent its development, optimal prevention of the condition would also be dependent on research to
establish which treatment regimes are efficacious and/or best practice; and many aetiological questions about the biological mechanisms that operate at the outset of weight-gain would need to be answered before the full range of challenges to prevention can be said to be clarified[22].

If, therefore, the biomedical community were to cease conducting animal-based research into treatment options (drugs, specific dietary nutrients, and surgical therapy) and the basic biological mechanisms involved in weight gain, vital knowledge from this area that would also facilitate better preventive initiatives would be lost, or put beyond reach.

Furthermore, biomedical research programmes do not always deliver the results their designers anticipate, or hope for. Given the rather poor outcomes of efforts to contain the obesity epidemic to date[25], one might reasonably conclude that neither medical treatment nor preventive measures will deal with the obesity problem alone. However, together they certainly stand a better chance: perhaps the best, most prudent approach to fighting obesity will involve the pursuit of both strategies.

(2c) If distraction, no justification of animal use

The Distraction and the Efficacy premises, (2a) and (2b), appear to be rather weak, then. But it is still relevant to speculate about the moral consequences of banning the use of laboratory animals in light of these premises.

The first thing to point out is that, even if preventive measures could solve all of the problems associated with obesity, it would take time for preventive measures to be developed and become fully and widely effective. During this delay many people would develop obesity, and suffer, and
die prematurely of resulting lifestyle diseases. While society waits on effective methods of prevention it would be morally problematic not to carry on treatment-oriented obesity research.

In relation to the Distraction argument as a whole is also worth considering to what extent efficient measures to prevent obesity can be carried through in modern liberal democracies. In theory politicians and other decision makers could implement legislation prohibiting unhealthy lifestyles and making health-promoting behaviour, such as physical exercise, compulsory. Under favourable conditions such initiatives could perhaps eliminate sources of obesity stemming from factors in the living environment, social surroundings, and at the individual level. Successful cases of changes in mass lifestyle behaviour, which only involved soft and community-based initiatives, can be found, certainly. Perhaps the most notable is the North Karelia project in Finland, which also serves as a guide to future planning of obesity prevention[16]. But we have to ask ourselves: is it a reasonable assumption that competing nation states will act in a concerted way to implement strong and enduring legislative measures internationally? This appears unlikely in the foreseeable future—not least, because western democratic countries, and increasingly non-western countries, have strong institutions that protect and facilitate freedom of speech and action both at the political-legislative level and at a more discursive level. Legislation targeting consumption in the private sphere, then, seems to be off-limits for decision makers. At most it would be politically possible to manage lifestyle habits through economic incentives, such as fat-taxes, informational campaigns or infrastructures favouring physical exercise. However, obviously, there is no guarantee that these measures would be as successful as those in the North Karelian case.
To summarise, then, although exemplary cases of preventive initiatives can be cited, it is far from clear that preventive measures targeting obesity will be effective to the extent that research into obesity treatment becomes unnecessary.

**DOES THE USE OF ANIMALS IN RESEARCH INTO LIFESTYLE DISEASES CALL FOR SPECIALIZED ETHICAL DISCUSSION?**

Neither the Responsibility argument nor the Distraction argument is decisive. The evidence we currently possess fails to support the empirical premises of these arguments adequately; and both arguments rely on debatable general moral assumptions – e.g. that we have no duty to help people to cope with their self-inflicted problems. We wish to stress that in this paper we have not taken a stance on the questions whether it is ever morally acceptable to use animals in harmful experiments with the aim of preventing, curing or alleviating serious human disease. Rather we have asked whether, if such experiments are not ruled out in general, there are special reasons why we should not use animals in the study of obesity (and possibly other so-called lifestyle diseases). We have argued that animal research designed to improve our understanding of, and deliver medical treatments for, human obesity should not be seen as more problematic, ethically speaking, than animal-based research into therapies for human diseases that are not linked to lifestyle.

Of course, this does not entail blanket approval of every variety of animal research into obesity. There is ample room for a critical debate over which aspects of this disease are appropriately addressed in animal studies.
Acknowledgements: We thank Reinhard Huber, Jesper Lassen, Dorte Bratbo Sørensen and Orsolya Varga for constructive discussions and comments on the paper. We also thank Paul Robinson for language editing. The study reported was financed by the Danish Agency for Science, Technology and Innovation under the Ministry of Science, Technology and Innovation.
### Table 1 Quantity of articles pertaining to obesity research in the time period 1995-2010 - divided into four research directions (row per cent in parentheses) [column per cent in brackets]*

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Diet Therapy (a)</td>
<td>374 (13.3%) [24.4%]</td>
<td>501 (17.8%) [16.5%]</td>
<td>858 (30.5%) [12.9%]</td>
<td>1076 (38.3%) [10.1%]</td>
<td>2809</td>
<td></td>
</tr>
<tr>
<td>Drug Therapy (b)</td>
<td>445 (11%) [28.8%]</td>
<td>705 (17.4%) [23.2%]</td>
<td>1201 (29.7%) [18%]</td>
<td>1692 (41.9%) [17.1%]</td>
<td>4043</td>
<td></td>
</tr>
<tr>
<td>Prevention and control (c)</td>
<td>347 (4.5%) [22.5%]</td>
<td>1049 (13.6%) [34.6%]</td>
<td>2537 (32.9%) [38.1%]</td>
<td>3769 (48.9%) [38.2%]</td>
<td>7702</td>
<td></td>
</tr>
<tr>
<td>Surgery (d)</td>
<td>377 (5.8%) [24.4%]</td>
<td>779 (11.8%) [25.7%]</td>
<td>2070 (31.6%) [31.1%]</td>
<td>3300 (50.8%) [33.7%]</td>
<td>6444</td>
<td></td>
</tr>
<tr>
<td>Total: all research directions</td>
<td>1543 (7.3%)</td>
<td>3034 (14.4%)</td>
<td>6666 (31.6%)</td>
<td>9867 (46.7%)</td>
<td>21110 (100%)</td>
<td>100%</td>
</tr>
</tbody>
</table>

* All row percentages do not sum to 100 due to rounding error.

\(a\) Dietary and nutritional management of obesity.

\(b\) Treatment of obesity by administration of drugs, chemicals, and antibiotics.

\(c\) Increasing human or animal resistance against obesity, e.g., immunization, for control of transmission agents, for prevention and control of environmental hazards, or for prevention and control of social factors leading to disease.
Operative procedures on organs, regions, or tissues in the treatment of obesity.
REFERENCES


8 Lund TB, Sandøe P, Lassen J. Attitudes to Publicly Funded Obesity Treatment and Prevention. *Obesity (Silver Spring)* 2011;19:1580-1585.


10 Hobson-West P. The role of ‘public opinion’ in the UK animal research debate. *J Med Ethics* 2010;36:46-49.


