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Alternative Medicine in general populations:
Use and perceived efficacy

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Abstract

Proponents of Complementary and Alternative Medicine (CAM) argue that these treatments can be used with great effect in addition to, and sometimes instead of, conventional medicine, a position which has drawn sustained opposition from those who advocate an evidence-based approach to the evaluation of treatment efficacy. Using recent survey data from the UK, this paper seeks to establish a clearer understanding of the nature of the public's relationship with CAM within the general population by focusing on beliefs about the perceived effectiveness of homeopathy, in addition to its reported use. Using recent data from the UK, we initially demonstrate that reported use and perceived effectiveness are far from coterminous and argue that for a proper understanding of the motivations underpinning public support of CAM, consideration of both reported use and perceived effectiveness is necessary. We go on to demonstrate that although the profile of homeopathy users differs from those who support this form of medicine, neither outcome is dependent upon peoples' levels of knowledge about science. Instead, the results suggest a far greater explanatory role for need and concerns about conventional medicine.

Keywords: Complementary and Alternative Medicine; Homeopathy; Population Estimates; Public Understanding of Science

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Introduction

For its proponents, Complementary and Alternative Medicines (CAM), such as reiki, acupuncture, herbal medicines, homeopathy, and healing crystals offer a 'natural' and efficacious¹ alternative to conventional medicine. They contend that CAMs can be used with great effect alongside, even instead of, conventional medicine (Easthope et al. 2000) and that those who oppose complementary approaches are wedded to a narrow and restrictive view of both medical practice and treatment evaluation (Barry 2006; Callahan 2002; Walach 2009; Caulfield and Debow 2005). The idea that alternative approaches to medical treatment, which do not have an established clinical efficacy, have a place within modern systems of health care has been lent credence by the fact that a range of CAM treatments have been prescribed and made available through publicly funded healthcare systems throughout the world, including in the UK (see HoC Report 2010). CAM practitioners have, in turn, faced sustained opposition from those who advocate an evidence-based approach to the evaluation of treatment efficacy, via Randomised Controlled Trials (RCT) (see Segar 2011 for a review). 'Over the counter' herbal remedies and traditional Chinese herbalism have been criticised for advancing unsubstantiated claims about efficacy and for appearing to argue that a 'natural' remedy cannot be harmful (Beyerstein 2001; Ernst 2007). Homeopathy, in particular, has served as a lightning rod for critical attention from the medical and scientific community, with a series of meta-analyses suggesting it works no better than a placebo (Kleijnen et al. 1991; Boissel et al. 1996; Linde & Melchart 1998; Cucherat et al. 2000; Shang et al. 2005) and others arguing that the proposed mechanism underlying homeopathy, the 'law of similars' (Grossinger 1998), is scientifically implausible (Ernst 2008; HoC Report 2010; Sehon and Stanley 2010). Critics have also drawn attention to instances of homeopaths overlooking or disregarding existing diagnoses, and of patients dying after homeopathic practitioners recommended cessation of conventional medical treatments for life-threatening conditions (Goldacre 2007).

Given the high degree of public controversy surrounding the use and regulation of CAM, many studies have focused on why people turn to this form of medicine. Much of the existing literature in this area relies on data from convenience samples of service users (see, for example, Kav 2009; Manya 2012; Sirois 2005; Hori et al. 2008; Taylor et al. 2006; Braun et al. 2010). While such approaches provide insights into the motivations for and experiences of CAM use, they are not well-suited to drawing inferences about how practices and beliefs are distributed across the population as a whole. Where studies have used data on CAM from representative sample surveys of the general population, attention to date has focused exclusively on measures of reported use (for example Astin 1998; Barnes

¹ Although most users of complementary medicine will not be aware of the distinction between 'efficacy' and 'effectiveness', we use the former term here due to its greater clarity of meaning and for consistency with the existing literature.

et al. 2008; Hunt et al. 2010). This appears to be based on an implicit assumption that users of CAM believe these treatments to be efficacious and, by the same token, that non-users do not. However, it is our contention here that the relationship between reported use and perceived effectiveness of CAM treatments is likely to be rather more contingent than this. In particular, there is no strong reason to assume that people who do not report having used CAM in the past will also believe that these treatments will not be potentially beneficial to their health in the future. Likewise, we should not assume that just because individuals report having used a CAM treatment at some point in their life that they also support it as an efficacious treatment. Thus, for a proper understanding of public uptake and support of CAM, a consideration of both reported use and perceived efficacy is necessary.

The paper proceeds as follows. First, we review the existing survey evidence relating to levels of use of CAM within general populations in Europe and North America, where the majority of the existing survey evidence is based. We then set out the primary explanations that have been advanced to date to explain individual-level motivations for CAM use. Next, we describe the data and key measures to be used in our analysis, before presenting our multivariate results. Our analysis shows that use of homeopathy is far from coterminous with a belief in its efficacy and that the characteristics associated with use and perceived efficacy are sufficiently distinct as to suggest different conclusions about underlying causes of CAM prevalence.

Public use of CAM: existing survey evidence

Before discussing the existing evidence on use and beliefs about CAM within the general public, we must first be more precise about what we mean by 'CAM'. This is not an easy task, with CAM treatments often being defined in terms of what they are not, as opposed to what they are. The World Health Organisation (WHO), for example, defines CAM as "a broad set of health care practices that are not part of that country's own tradition and are not integrated into the dominant health care system" (WHO 2000). An expedient solution to this definitional boundary problem is to enumerate the sorts of remedies that are offered by practitioners as CAM treatments and to use this as the working definition of what constitutes CAM. Adopting this approach, the 2000 UK House of Lords Report into CAM identified 29 different treatments under 3 broad headings: 'Professionally Organised Alternative Therapies', which incorporate diagnostic approaches and include such treatments as acupuncture and homeopathy; 'Complementary Therapies', which do not embrace diagnostic skills and include such approaches as massage and reflexology; and finally 'Alternative Disciplines', which favour a more philosophical approach such as Ayurvedic medicine and Traditional Chinese medicine (HoL Report 2000).

The same list-based approach has been adopted by survey researchers, who have estimated

levels of national CAM use by presenting respondents with a list of treatments and asking them to identify which ones they have taken over a defined period (see for example Barnes et al. 2008; Eisenberg et al. 1998; MacLennan, Myers and Taylor 2006; Metcalfe et al. 2010; Hunt et al. 2010; Smith et al. 2010; Thomas, Nicholl and Coleman 2001). Because the number and range of treatments presented to respondents varies considerably between different surveys, drawing meaningful conclusions about differences in usage across countries and over time is difficult. For instance, surveys conducted in 1990 and 1997 in the United States listed a total of 16 treatments (Eisenberg et al. 1998), while in the 2007 National Health Interview Survey (NHIS) survey, 21 treatments were presented (Barnes et al. 2008), including 'vegetarian diet' and 'pilates', which many would not consider to be CAMs. In contrast, the Canadian Community Health Survey (CCHS) lists 12 CAM treatments (Metcalfe et al. 2010), while the Eurobarometer survey lists only 7 of the more common CAM treatments, rather than attempting an exhaustive list. If we limit the 2007 NHIS estimate to only those treatments which are listed in the 2005 Eurobarometer, for example, then the figure for the US becomes 32%, statistically indistinguishable from the UK estimate of 31%. However, truncating lists in this way so that they are equivalent across countries throws up problems of its own; because of the cultural specificity of many CAM treatments, a truncated list is unlikely to provide a valid measure of total CAM use in a particular country.

Rather than presenting respondents with a list of CAM treatments, some surveys have left the definition to respondents by asking whether or not they had 'used alternative or complementary therapies' within the last year and then asked those reporting use to list the treatments they had taken. This approach yielded an estimate of 20% of adult CAM users in the UK (Ernst and White 2000). Similarly, the 1991 wave of the British Household Panel Survey asked respondents who reported that they had used any health service during the previous year to identify any services they had used from a list presented to them on a show-card. One of the services on the list presented was 'alternative medical practitioner (e.g. homeopath, osteopath)' and this resulted in just 3% of respondents reporting use of CAM. While this approach has the merit of allowing respondents to provide their own definition of what constitutes CAM, it is clearly rather problematic for this very same reason; different people will count or exclude treatments according to their own criteria, resulting in wide variability in estimates depending on how the question is framed. For instance, the fact that the BHPS referred specifically to homeopathy and osteopathy may have indicated to respondents that these were the only treatments that constitute CAM. It is also likely that the BHPS question suffers from under-reporting due to people who have used CAM not considering this to be a 'health service' in the first place and so not being presented with the follow-up question and show-card.

In summary, then, while existing estimates of general population use differ quite substantially

from one another, it would be unwise to attribute this variability to underlying differences in CAM usage because of difficulties in defining what constitutes CAM, inconsistencies in the methodological approaches adopted, and the cultural specificity of many CAM treatments (Harris and Rees 2000). Nonetheless, it seems clear that, whatever the 'true' level of CAM use, a substantial minority of publics across Europe and the United States do use these treatments in very large numbers, which begs the question, why is this so?

Why do people use CAM?

In addition to estimating population CAM use, a number of studies have investigated the motivations behind its uptake. The dominant theoretical approach has been to adapt the Socio-Behavioural Model (SBM) of health care use (for example Kellner & Wellman 1997; Sirois & Gick 2002; Upchurch et al. 2008), which emphasises predisposing factors such as gender, as well as enabling resources like income, and finally psychological need, such as the presence of poor self-reported health. Indeed, such analyses have revealed some robust empirical regularities, with adult CAM users consistently found to be:

- Early to middle-aged (Braun et al. 2010; Hyland, Lewith & Westoby 2003; Messerer et al. 2001; Metcalfe et al. 2010);
- Female (Egede et al. 2002; Hämeen-Anttila 2011; Hori et al. 2008; MacLennan, Wilson and Taylor 2002; McCaffrey et al. 2004; McFarland et al. 2002; Nguyen et al. 2011; Rafferty et al. 2002; Sturm 2000; Unutzer et al. 2000);
- Better educated (Astin 1998; Bains & Egede 2011; Blais et al. 1997; Burke et al. 2006; Hämeen-Anttila 2011; Hanssen et al. 2005; MacLennan et al. 1996; Mantyranta et al. 1999; McCaffrey et al. 2004; McFarland et al. 2002; Nilsson et al. 2001; Rafferty et al. 2002; Sturm 2000; Thomas and Coleman 2004; Unutzer et al. 2000; Upchurch et al. 2005);
- Higher than average earners (Bair et al. 2002; Fennell 2004; Garrow & Egede 2006; Thomas and Coleman 2004; Unutzer et al. 2000; Upchurch et al. 2005); and
- Suffering from poorer self-reported health (Astin 1998; Bausell et al. 2001; Bazargan et al. 2005; Bell et al. 2005; Hori et al. 2008; Hull et al. 2006; Metcalfe et al. 2010; Pawluch, Cain & Gillett 2000; Sturm 2000; Testerman et al. 2004; Unutzer et al. 2000; Upchurch et al. 2005; Yates et al. 1993).

In addition to the SBM approach scholars have also pointed to the 'push' factor of dissatisfaction with conventional medicine as an explanation of CAM usage (Shaw et al. 2006). Some studies suggest that

this dissatisfaction manifests as a result of impersonal and uncompassionate treatment within the conventional healthcare system, with CAM users favouring more holistic approaches over the 'quick fix' solutions offered by conventional practitioners (Adams et al. 2011; Conboy et al. 2007; Kellner and Wellman 1997; Sirois & Gick, 2002). Others suggest that dissatisfaction emerges when individuals have experienced an illness for which conventional medicines proved to be ineffective and/or caused significant side-effects, leading to a belief that 'natural' treatments are safer and potentially more effective than pharmaceutical products (Furnham 2003; Furnham et al. 1995; HoL Report 2000; Lynse 1989; O'Callaghan & Jordan 2003).

A third category of explanation is that users lack a proper understanding of science and scientific method. As we noted earlier, a strict scientific approach to evidence-based medicine is incompatible with a belief in the validity of CAM. This has led some scholars to conclude that use of CAM is predicated on ignorance and mis-trust of science (Beyerstein 2001), a contention which garners some support from a handful of studies which suggest that CAM users are more likely to hold anti-science attitudes (Furnham 2007; Mackova and Ertubey 2009; Pettersen and Olsen 2007) and being more likely to rely on 'intuitive' as opposed to 'deliberate' reasoning (Lindeman 2011). The underlying argument here is that a lack of engagement with science and a cognitive bias towards personal experience over empirical evidence leads to the development of false beliefs about how the efficacy of treatments can or should be determined (Gray 1998; Vincent et al. 1995).

The findings of existing research, then, have revealed a consistent picture of the demographic profile of CAM users, with evidence also suggesting that CAM users are disillusioned with conventional medicine and ambivalent toward science. However, the focus of these studies has been on reported use of CAM. In the following section we examine the extent to which reported use is reflective of beliefs about its perceived efficacy and whether the profile of CAM users changes when we switch to a measure of perceived efficacy. Because of the ambiguity relating to what constitutes CAM, which we discussed earlier, our analyses focus on one prominent and controversial CAM treatment, homeopathy.

Data and Measures

We use data from the 2009 Wellcome Monitor adult survey of public knowledge, interest and engagement in biomedical science. The Monitor uses a stratified, multi-stage probability sample design, with the Postcode Address File (PAF) used as the sampling frame of households. One adult member, aged 18 or above, of each responding household was randomly selected for interview using the Kish grid procedure (Kish 1962). The survey achieved a response rate of 49% using AAPOR Response Rate 3 (American Association for Public Opinion Research, 2011), yielding 1,179 adults as our analytical

sample size (see Butt 2009 for full technical details of the survey). The data are weighted to correct for unequal selection probabilities. The strength of the Monitor for our purposes here is that in addition to asking about CAM use, it also asks respondents about their reasons for taking, and not taking, homeopathy and how effective they believe it is relative to conventional medicine. Specifically, respondents are asked:

- (1) "Now for some questions about alternative and complementary medicine. Have you ever used any of the things listed on this card? Herbal medicine; Homeopathy; Acupuncture; Reiki; Hypnotherapy; Chrystal healing"
- (2) "I'm now going to ask you some follow up questions about one of the treatments listed, homeopathy. What are your reasons for using homeopathy? (1) It does not have side effects, unlike conventional drugs; (2) It is more effective and can cure diseases better than conventional drugs; (3) I am willing to try anything and didn't think it could do any harm"
- (3) "I'm now going to ask you some follow up questions about one of the treatments listed, homeopathy. What are your reasons for not having used homeopathy?... (1) Nobody has ever advised me to use it; (2) It is too expensive; (3) There is no scientific proof of its effectiveness; (4) Conventional drugs are more effective; (5) I have not had an illness where I have needed this sort of treatment"
- (4) "People have different views about how effective homeopathy can be at treating illness. Compared with medical treatments available from your GP or other qualified medical staff, do you think that homeopathy can be... (1) More effective; (2) Just as effective; (3) Less effective than other medical treatments; (4) Not effective at all; (5) Depends on the illness (spontaneous answer); (6) Respondent doesn't know what homeopathy is (spontaneous answer)"

Table 1 shows the distribution of responses to the question about CAM use in the general population. Close to half (45%) of UK adults in 2009 reported that they have used one or more of the six treatments listed, at some point in their lives. This is close to the estimates of for 43% and 44% for lifetime CAM use in existing UK surveys which we reported earlier. It is also similar to the estimate reported for the United States in 2009, at 50%, although the number of treatments covered in the UK question is considerably shorter than, so meaningful comparisons are problematic. Nonetheless, our data confirm

that contemporary CAM use in the UK is high, with close to a majority of the population reporting that they have used at least one treatment at least once in their life. Herbal medicine is the most popular, homeopathy and acupuncture occupy the second rank of preference, reiki and hypnotherapy the third and 'crystal healing' the least popular, with 3% of the public reporting life-time use (although, it should be noted that this proportion represents close to two million adults). This popularity ordering mirrors the results obtained in the 1999 BBC survey, the 2007 British Social Attitudes Survey, and the 2005 Health Survey for England.

Table 1: Use of CAM treatments

Type	Percentage
None	54.3
Herbal medicine	28.2
Homeopathy	17.5
Acupuncture	16.1
Reiki	6.3
Hypnotherapy	5.8
Chrystal healing	2.9
N	1179

Source: Wellcome Monitor Survey 2010

Note: figures do not sum to 100% because more than one option could be chosen

Respondents who reported that they have never used homeopathy were asked why they had not done so. A quarter of this group gave their reason as being that they had not heard of it, a third indicated that they had never been advised to take this kind of treatment and/or that they had never had an illness that required it, while 3% said that homeopathic remedies were too expensive. Less than a quarter of non-users attributed their motivation for avoiding homeopathy to a lack of belief in its efficacy, or to the superiority of conventional treatments. When respondents were asked why they had used homeopathy, our results show that using homeopathic cures cannot be taken as indicating rejection of conventional medicine, or even of belief in the efficacy of homeopathy. The most common reasons cited for using homeopathy (49%), are that the user is 'willing to try anything and didn't think it could do any harm' and that homeopathic remedies 'do not have side effects, unlike conventional drugs'. Only 16% of homeopathy users indicated that they had taken these treatments because they are deemed to be more efficacious than conventional medicine.

It would seem, then, that use and non-use of homeopathy do not align neatly with beliefs about efficacy. To gain a clearer picture of this, Table 2 shows beliefs about the perceived efficacy² of

² The question uses the term 'effective' rather than 'efficacious'. However, it seems safe to assume that only a tiny minority of the general public will be aware of the rather technical difference in the meaning of the two terms and that the vast majority will interpret 'effective' as meaning whether the treatment 'works'.

homeopathy relative to conventional medicine for the public as a whole, and separately for users and non-users of homeopathy. Initially, 240 respondents (21%) said they had never heard of homeopathy when asked why they had not used it. The remaining 939 respondents who had heard of homeopathy were asked the follow up effectiveness question. However, an additional 96 respondents, when asked the effectiveness question, spontaneously said they had never heard of homeopathy. Combined with the initial 240 respondents, 336 respondents report never having heard of homeopathy, representing 29% of the total sample (these respondents are excluded from the denominator in table 2).

Table 2: Perceived efficacy of homeopathy compared to conventional medicine

Effectiveness Rating	Has used homeopathy %	Has not used homeopathy %	Total %
More effective	12.6	2.8	5.2
Just as effective	43.5	24.8	29.4
Less effective than other medical treatments	21.4	32.7	29.9
Not effective at all	5.8	17	14.2
Don't know		6.8	5.1
SPONTANEOUS Depends on the illness	16.8	15.9	16.1
N	207	636	843

Source: Wellcome Monitor Survey 2010

Although the data were collected prior to the publication of the Parliamentary report into homeopathy, which concluded that there was no evidence that it is efficacious (HoC Report 2010), it is nonetheless surprising that of those who have heard of homeopathy, a minority of the UK public (44%) rate it as either 'less effective' than conventional medicine, or 'not effective at all'. Just over a third (34%) believe it to be as effective or more effective than conventional medicine, and 16% say (spontaneously) that whether it is effective or not depends on the illness. The latter response, while not indicating a strong endorsement of the efficacy of homeopathy, presumably represents a belief that these treatments can work for some illnesses. Thus, just over 50% of Britons in 2009 expressed a belief which indicates that homeopathy is as effective, or more effective, than conventional medical treatments. Echoing the findings relating to the lack of correspondence between beliefs and behaviour, table 2 also shows that beliefs about efficacy do not align neatly with reported use. Although users are more positive about the efficacy of homeopathy than non-users, over a quarter of non-users (nearly 28%) rate homeopathy as either equal to or 'more effective' than conventional medicine. Similarly, just over one-fifth (21%) of users state that homeopathy is 'less effective' than conventional medicine, with nearly 6% stating that it

is 'not effective at all'.

This final finding that a significant minority of homeopathy users believe homeopathy to be less effective than conventional medicine or not effective at all may not, however, reflect cognitive-behavioural inconsistency on the part of this group. Firstly, use of alternative medicine is often a supplement to, and not a direct substitute for, conventional medicine, and given the side-effects of many standard medications, it is rational for individuals to pursue potentially less harmful alternative treatments even if they are widely deemed to be 'less effective' than current conventional treatments (Astin 1998). Furthermore, the 6% of users who believe homeopathy to be 'not effective at all', need not be interpreted as inconsistent or contradictory because the use question refers to lifetime use, whereas the efficacy question refers to current beliefs. It is, therefore, possible that these individuals used homeopathy in the past, believing it to be efficacious but, through experience and/or exposure to information, subsequently changed their minds. We can obtain some leverage on this question with responses to the follow-up question that was administered to anyone who reported having used homeopathy and which asked them their reasons for taking it. Of this small group (n=12) who said they had used homeopathy in the past but now believe it to be 'not effective at all', over half reported that their motive for usage was because homeopathy has 'no side-effects' or because it can do 'no harm', with the remaining respondents citing unspecified 'other' reasons for usage. More importantly, no respondents from this group reported that usage was motivated by a belief that homeopathy is 'more effective' than conventional medicine.

Explaining Homeopathy Use and Support

From these descriptive analyses, then, we can categorise the general population into three groups according to their homeopathy usage: those who have used it (17%), those who have heard of it but never used it (54%), and those who have never heard of it, or do not know what it is (29%). Similarly, in terms of perceived effectiveness, the general population can be divided by those who believe homeopathy to be just as or more effective than conventional medicine (36%), those who believe it to be less effective or not effective at all (32%), and those who are unsure, or do not know what homeopathy is (32%). It is also evident that homeopathy use does not necessarily reflect a belief in the efficacy of the treatment, and that its uptake within the general population does not appear to be strongly related to a rejection of conventional medicine. However, given that nearly a quarter of non-users believe homeopathy to be 'as effective' or 'more effective' than conventional medicine, it is clearly important to treat use and beliefs about efficacy separately.

The Wellcome Monitor also included a set of questions which allow us to incorporate the three types of explanations contained within the SBM into an explanatory multivariate model to help us

explain use of, and support for, homeopathy. First, predisposing factors, namely age, sex, and education level; second resources, relating to an individual's ability to access medical treatment, measured here by income level; and finally need, relating to an individual's desire for symptom relief from health problems, measured here by two items: whether respondent has a long term illness and self-reported health. We also include an item which measures respondents' levels of scientific knowledge using standard 'true/false' questions about different aspects of science. Nine statements are presented and respondents are asked whether they think each is definitely true, probably true, probably not true, definitely not true, or that they don't know. These responses are recoded so that correct answers (combining probably and definitely responses) are scored as '1' while incorrect answers and 'don't know' response are scored as zero.

The final explanatory variables in the model gauge dissatisfaction with conventional medicine. The first of these is a general optimism about medicine variable which asks respondents whether they think medical research will lead to improvements in the quality of life for people in the UK in the next twenty years. Finally, the Wellcome Monitor also asked respondents about nine types of concerns they might have with regards to research in conventional medicine. A Principal Components Analysis (available from the corresponding author upon request) revealed that these nine items can be reduced to four underlying dimensions, both positive and negative. We indicate in parentheses whether the concern expressed denotes a positive or a negative: (1) concern about a lack of regulation – that medical research moves “too fast”, there are a “lack of rules” to control what scientists do, and concerns are expressed about the “role of private companies” (negative); (2) concern about too much regulation (positive); (3) concern that there are significant “future risks” and that it is “too expensive” (negative); (4) concern that developments are “too slow” and there is too little money available (positive). Coding for all variables included in the analysis are provided in Appendix A.

In order to assess whether a measure of perceived efficacy yields a different profile of characteristics than a measure of use, Table 3 presents the results of two binary logistic regression models.³ Model (a) has homeopathy use as the dependent variable, model (b) has perceived efficacy as the dependent variable. The coefficients for model (a) show, for each independent variable, the odds of being a homeopathy user rather than a non-user, while for model (b) the contrast is between those who believe homeopathy to be effective and those who do not. Model (a) shows that users are more likely to be female (OR = 0.56), educated (OR = 2.12 and 2.82 respectively for those with

³ It can be problematic to estimate a series of binary logistic models for a categorical outcome with more than two categories because the individual level predicted probabilities are not constrained to sum to unity. We therefore also fitted these models using multinomial regressions, in which the 'don't know' category was included as an additional contrast. The results were substantively identical so we present only the binary outcome models here. Results of the multinomial regressions are available from the corresponding author upon request.

GCSEs/'A' Levels and a degree and above), to have a disability or long term illness (OR = 1.77), and to be less likely to be optimistic about conventional medicine's ability to improve quality of life (OR = 0.65). It is also noteworthy that scientific knowledge does not discriminate between users and non-users of homeopathy, despite claims that use of alternative medicine is symptomatic of low levels of engagement with science (e.g. Beyerstein 2001).

Table 3: Binary logistic regressions predicting a) use and b) perceived efficacy of homeopathy

	Model a) Use			Model b) Perceived Efficacy		
	OR	95% Confidence Interval		OR	95% Confidence Interval	
		Lower	Upper		Lower	Upper
Predisposing factors						
Age	0.99	0.98	1.00	0.98**	0.97	0.99
Sex	0.56***	0.40	0.78	0.65**	0.48	0.87
GCSEs/'A' levels	2.12**	1.22	3.67	1.21	0.78	1.88
Degree and above	2.82***	1.56	5.10	0.87	0.53	1.40
Resources (ref = lowest income quartile)						
Income quartile (2nd)	1.23	0.72	2.12	1.00	0.63	1.61
Income quartile (3rd)	0.96	0.54	1.71	0.71	0.43	1.17
Income quartile (highest)	0.99	0.56	1.74	0.78	0.48	1.28
Income missing	1.45	0.83	2.55	0.95	0.58	1.56
Need						
R has disability/illness	1.77*	1.13	2.75	1.02	0.68	1.52
Self-reported health	0.98	0.79	1.22	1.10	0.90	1.34
Knowledge						
Science quiz	0.99	0.89	1.11	0.93	0.84	1.02
Concerns with conventional medicine						
Medicine and QoL	0.65***	0.52	0.83	1.05	0.84	1.30
Too fast, no rules, private companies	1.20	0.95	1.51	1.46***	1.18	1.82
Too slow, no money,	1.07	0.88	1.30	0.89	0.75	1.06
Future risks, expensive	0.83	0.65	1.07	1.10	0.88	1.37
Too regulated	1.92	0.98	3.76	2.76	1.36	5.61
Nagelkerke r		.10				.09
N		843				800

Source: Wellcome Monitor Survey 2010

Notes: OR = Odds Ratio; *** p<.001, **p.<.01, *p<.05; N for model b is lower as it excludes the 43 respondents who say they 'don't know' what the effectiveness of homeopathy is.

Turning to model (b), we can see that those who believe homeopathy to be efficacious are more likely to be slightly younger (OR = 0.98) and to be female (OR = 0.65). But, while use is associated with need and a lack of optimism about conventional medicine, the only other significant predictor is the concern that medical research moves 'too fast', which also incorporates concerns over the lack of rules in medical research and the role of private companies (OR = 1.46). This suggests that those who support homeopathy as an efficacious treatment are also the same individuals who are more likely to favour

greater regulation for conventional medical science. Finally, as with reported use, scientific knowledge does not discriminate between those who do and do not believe homeopathy to be efficacious.

Discussion

The increasing popularity of CAM treatments in countries across the world has created a growing need to understand who uses these treatments and what their motivations are for doing so. However, limitations in existing survey-based approaches to researching CAM mean that there remains much that is not well understood about these important questions as they relate to general populations. Part of the reason for this is that existing investigations have, if only implicitly, treated reported use as if it were coterminous with beliefs about efficacy. However, the data analyses presented in this article have demonstrated the weakness of this assumption. As we have seen, lifetime users of homeopathy differ in their opinions about how effective this treatment is relative to conventional medicine, with a majority offering unconditional support for its effectiveness, some offering conditional support ('it depends on the illness'), while others declaring it to be 'less effective' than conventional medicine, and even that it is 'not effective at all'. By the same token, many non-users appear to regard homeopathy as an efficacious treatment. These findings suggest two important conclusions: first, that non-use of homeopathy does not appear to be based primarily on scientific/efficacy grounds and, second, that measures of use cannot be interpreted as coterminous with beliefs about perceived efficacy. For homeopathy at least, non-use seems to be primarily motivated by lack of familiarity and/or opportunity, rather than scepticism about the scientific basis of homeopathic medicine and the efficacy of the treatment. Put somewhat differently, there are good grounds from this evidence to assume that a high proportion of non-users of homeopathy would be willing to use this controversial treatment, if they were advised to do so and could afford to pay for it. For use, rather than denoting a rejection of conventional medicine, the data revealed a widespread opinion indicative of an 'open-minded' approach to alleviating symptoms, which is based not so much on firm beliefs that homeopathy will 'work' but on a hope that it might work, allied with a strong belief that it is unlikely to cause any harm.

The multivariate analyses provided clearer evidence that, though there are some commonalities, the profile of the typical homeopathy supporter is quite different when support is operationalized as perceived efficacy rather than reported use. Homeopathy use in our analyses was most strongly associated with need for symptom alleviation, as well as scepticism that conventional medicine improves quality of life. While not representing a rejection of conventional medicine in relation to the treatment of illnesses per se, this latter finding does suggest that people use CAM with the aim of promoting a broader notion wellbeing, as opposed to simply treating poor health or specific symptoms

(Long 2009; Sointu 2006). Perceived efficacy, on the other hand, was related to concerns about the pace of scientific research, lack of regulation and involvement of private companies. The role of private companies, in particular, could indicate mistrust of pharmaceutical drugs, which perhaps relates to a wider set of beliefs among CAM users which favour natural and holistic forms of treatment (Bishop, Yardley and Lewith 2005; O'Callaghan and Jordan 2003). Despite these differences, it is notable that neither use nor perceived efficacy of homeopathy were related to scientific knowledge or rejection of conventional medicine, the two primary causes that are conventionally offered to explain its uptake. Indeed, homeopathy use was found to be disproportionately concentrated amongst those with higher academic qualifications. This would suggest that orientations towards homeopathy are, therefore, more likely to be determined by wider value structures as opposed to more specific, 'cognitive' concerns relating to engagement with science (Astin 1998; O'Callaghan and Jordan 2003).

While these findings provide useful insights into the nature of use and support for a controversial CAM in the UK, there are some important caveats that should be borne in mind when considering their broader implications. First, our analyses have focused on only one type of CAM treatment, homeopathy. While this has the benefit of specificity, it also means that we do not know the extent to which our findings generalise to other CAM treatments. Indeed, homeopathy is very much a special and controversial case in the field of alternative medicine. In recent times, it has garnered more public attention and criticism from scientific quarters than any CAM. We should be cautious, therefore, before concluding that the findings presented here will generalise to CAM treatments such as massage, osteopathy and chiropractic care, which have received greater support from clinical trials (Cherkin et al. 2009; Ernst and Pittler 1999; Vincent and Furnham 1997). Second, the models used to predict use and perceived efficacy exclude potentially important explanatory variables. The significance of some of the concerns about conventional medicine may reflect wider beliefs relating to the 'benevolence of nature' and holistic approaches to health (O'Callaghan and Jordan 2003) in addition to other differences in worldviews (Lindeman 2011). It should also be acknowledged that some potentially important concepts were not available to include in our multivariate models, such as those relating to patient experiences, both positive and negative, with conventional practitioners (McFadden et al. 2010). Despite these reservations, however, we believe our findings take important steps toward a better understanding of the widespread prevalence of alternative medicine within the general public, with our results contributing to the emerging picture of CAM users as having a multitude of complex motivations (Segar 2011).

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APPENDIX A: Coding of dependent variables in multinomial linear regression

Age = continuous variable

Sex = (0) female; (1) male

GCSEs/'A' levels = (0) no qualifications; (1) GCSEs/ 'A' levels

Degree and above = (0) no qualifications; (1) Degree/Postgraduate degree

Income = Income quartile dummies

R has disability/long term illness = (0) no; (1) yes

Self-reported health = (1) very bad; (2) bad; (3) ok; (4) good; (5) very good

Science quiz = ten-point scale ranging from 0 to 9 based on number of correct answers to quiz

Medicine and quality of life = (1) Definitely not; (2) Probably not; (3) Probably will; (4) Definitely will

Lack of regulation = total number of negative responses, four point scale

Too slow = total number of positive responses, four point scale

Risks = total number of negative responses, three point scale

Too much regulation = (0) not mentioned; (1) mentioned