Acceptability of financial incentives for health behaviours: a discrete choice experiment

Emma L Giles,[1] Frauke Becker,[2] Laura Ternent,[2] Falko F Sniehotta,[2] Elaine McColl,[2] Jean Adams[3*]

[1]School of Health & Social Care, Health & Social Care Institute, Teesside University, Middlesbrough, UK

[2]Institute of Health & Society, Newcastle University, Newcastle upon Tyne, UK

[3]MRC Epidemiology Unit, University of Cambridge, Cambridge, UK

***Correspondence to:** jma79@medschl.cam.ac.uk

Note: Emma L Giles and Jean Adams were affiliated with Institute of Health & Society, Newcastle University when this work was conducted. Current affiliations are listed.

Abstract

Background

Healthy behaviours are important determinants of health and disease, but many people find it difficult to perform these behaviours. Systematic reviews support the use of personal financial incentives to encourage healthy behaviours. There is concern that financial incentives may be unacceptable to the public, those delivering services and policymakers, but this has been poorly studied. Without widespread acceptability, financial incentives are unlikely to be widely implemented. We sought to answer two questions: what are the relative preferences of UK adults for attributes of financial incentives for healthy behaviours? Do preferences vary according to the respondents' socio-demographic characteristics?

Methods

We conducted an online discrete choice experiment. Participants were adult members of a market research panel living in the UK selected using quota sampling. Preferences were examined for financial incentives for: smoking cessation, regular physical activity, attendance for vaccination, and attendance for screening. Attributes of interest (and their levels) were: type of incentive (none, cash, shopping vouchers or lottery tickets); value of incentive (a continuous variable); schedule of incentive (same value each week, or value increases as behaviour change is sustained); other information provided (none, written information, face-to-face discussion, or both); and recipients (all eligible individuals, people living in low-income households, or pregnant women).

Results

Cash or shopping voucher incentives were preferred as much as, or more than, no incentive in all cases. Lower value incentives and those offered to all eligible individuals were preferred. Preferences for additional information provided alongside incentives varied between behaviours.

Younger participants and men were more likely to prefer incentives. There were no clear differences in preference according to educational attainment.

Conclusions

Cash or shopping voucher-type financial incentives for healthy behaviours are not necessarily less acceptable than no incentives to UK adults.

Keywords

Smoking cessation; exercise; vaccination; mass screening

Introduction

Healthy behaviours such as not smoking, regular physical activity, and taking part in vaccination and disease screening are important determinants of health, morbidity and mortality.[1, 2] However, engagement in these behaviours remains far from optimal. Worldwide, physical inactivity and dietary risk factors account for around 10%, and tobacco 6%, of disability adjusted life-years lost.[2] In the UK, comparable figures are 14% and 12% respectively.[3] Only 51% of UK adults in at-risk groups receive influenza vaccinations;[4] and 20-30% do not engage in cancer screening.[5] In response to these findings, national and international public health strategies include maximising healthy behaviours as core components.[6-8]

One method of encouraging healthier behaviours, that has received significant recent attention, is personal financial incentives.[9-11] These have been defined as financial rewards provided contingent on behaviour change.[10, 12, 13] Financial incentive interventions for healthy behaviours (termed 'financial incentives' hereafter) are increasingly used, encouraged, or being considered, by governments around the world. Large programmes exist in some low and middle income countries incentivising a range of maternal and child health behaviours.[14] The Affordable Care Act in the USA allows insurers to offer contingent incentives up to a value of 30% (50% if targeting tobacco) of the cost of insurance plans.[15] On-line, websites such as www.stickk.com allow users to incentivise themselves to achieve almost anything, including their health behaviour goals.

A number of systematic, and other, reviews support the use of financial incentives.[10, 16-23] Non-systematic reviews have reported that financial incentives are more effective for

71 'one off' behaviours such as attending for screening and vaccination, than more complex
72 behaviours such as smoking cessation.[17, 19] However, this is not confirmed in systematic
73 reviews. Systematic reviews find that the effects of financial incentives do not vary
74 according to incentive value or target behaviour, but may be larger in more deprived
75 groups.[10, 16] Whilst these systematic reviews find prolonged effects of continuing
76 incentives, effects after intervention removal appear to decrease over time.[10, 16, 23]

77 Despite this positive evidence of effect, there are concerns that financial incentives remain
78 unacceptable to the public, potential recipients, those involved in front-line health
79 promotion delivery, and policymakers.[9, 11, 24] Without widespread acceptability, financial
80 incentives are unlikely to be widely implemented[25] – meaning their potential will not be
81 achieved. Key concerns with financial incentives identified in qualitative research include a
82 perception that they reward 'bad' behaviour, are socially divisive and ineffective, and that
83 they are too easy for participants to manipulate or 'game'.[11, 26-28]

84 Whilst there is much concern about the acceptability of financial incentives, there is less
85 primary evidence describing this. One systematic review of both empirical studies and
86 scholarly writing found substantial scholarly concerns about the ethics and practicalities of
87 financial incentives.[11] A number of surveys of the public were also included, but the
88 review identified little in-depth exploration of what aspects of financial incentives for
89 healthy behaviours are, and are not, acceptable. Greater understanding of what influences
90 the acceptability of financial incentives may help in designing interventions which are both
91 acceptable and effective.

92 Qualitative research has identified a range of concerns that stakeholders have about
93 financial incentives,[26, 27] but cannot determine the relative importance of these. Discrete

choice experiments (DCEs) are a quantitative method for exploring stated, rather than revealed, preferences for the characteristics of services, interventions or policies.[29] A small number of recent studies have used DCEs to explore relative preferences for different aspects of financial incentives for healthy behaviours. These find that more flexible payments (e.g. cash) are preferred by potential recipients to those that can only be spent on specific goods (e.g. at a sports shop or venue).[30, 31] However, the range of financial incentive characteristics and health behaviours that have been explored using DCE methods are both limited. Nor has any attempt been made to determine how preferences may vary according to characteristics of respondents. Furthermore, studies have focused specifically on acceptability of financial incentives to potential recipients of financial incentives. In the context of a publically funded healthcare system, such as the UK, where any large scale financial incentive programme is likely to be publically funded, wider acceptability of financial incentives to the general public as a whole, and not just potential recipients, is also important.

We conducted a DCE with the aim to explore relative preferences of UK adults for a range of attributes previously identified as influencing acceptability of financial incentives; as well as whether these preferences varied according to socio-demographic characteristics of respondents. We did not restrict our sample to potential recipients of the financial incentives investigated.

Methods

Discrete choice experiments describe hypothetical interventions according to their key characteristics, or ‘attributes’ (e.g. type of reward, value of incentive), and ‘levels’ of these

attributes (e.g. cash, shopping voucher; higher, lower values). Participants are then asked which of a small number of intervention 'scenarios', combining different levels of each attribute, they prefer. This allows relative preferences for attribute levels to be determined. Discrete choice experiments are well-established in health economics[32-34] and increasingly used in public health.[35-37] We followed best practice recommendations for conducting a DCE,[38, 39] collecting data from UK adults in an on-line survey.

Identification of behaviours, attributes and levels

We focused on four healthy behaviours for which there is evidence that financial incentives can be effective:[10] smoking cessation, regular physical activity, attending a primary care provider for disease screening, and attending a primary care provider for adult vaccination. We used a range of previous research to identify attributes, and levels, of financial incentives that are likely to influence acceptability (see **Table 1**).[11, 13, 26] In accordance with reporting recommendations for DCEs.[40] the qualitative research used to inform attribute development is reported in full elsewhere.[26] In all cases, attributes and levels were realistic and plausible in policy terms.[38, 39]

131 **Table 1 – attributes and levels of financial incentive interventions four health behaviours**

Attribute	Levels for smoking cessation	Levels for regular physical activity	Levels for attending for vaccination	Levels for attending for screening
Type of incentive	No reward	No reward	No reward	No reward
	Cash	Cash	Cash	Cash
	Shopping vouchers	Shopping vouchers	Shopping vouchers	Shopping vouchers
	Lottery tickets	Lottery tickets	Lottery tickets	Lottery tickets
Total value	£15 over four weeks	£15 over four weeks	£15 for one off attendance	£15 for one off attendance
	£140 over four weeks	£140 over four weeks	£140 for one off attendance	£140 for one off attendance
	£265 over four weeks	£265 over four weeks	£265 for one off attendance	£265 for one off attendance
	£390 over four weeks	£390 over four weeks	£390 for one off attendance	£390 for one off attendance
	£515 over four weeks	£515 over four weeks	£515 for one off attendance	£515 for one off attendance
	£1000 over four weeks	£1000 over four weeks	£1000 for one off attendance	£1000 for one off attendance
Schedule	Same value each week	Same value each week	NA	NA
	Value progressively increases	Value progressively increases	NA	NA
Other information provided	No other information	No other information	No other information	No other information
	Written leaflet on harms of smoking & ways to quit	Written leaflet on benefits of activity & ways to be more active	Written leaflet on benefits of disease screening	Written leaflet on benefits of vaccination
	Face-to-face discussion on harms of smoking & ways to quit	Face-to-face discussion on benefits of activity & ways to be more active	Face-to-face discussion on benefits of vaccination	Face-to-face discussion on benefits of disease screening
	Written leaflet & face-to-face discussion on harms of smoking & ways to quit	Written leaflet & face-to-face discussion on benefits of activity & ways to be more active	Written leaflet & face-to-face discussion on benefits of vaccination	Written leaflet & face-to-face discussion on benefits of disease screening
Recipients	Smokers living in low income households	People living in low income households	People living in low income households	People living in low income households
	Pregnant women smokers	Pregnant women	Pregnant women	Pregnant women
	All smokers	Anyone	Anyone	Anyone

132

In studies included in systematic reviews,[10, 16] financial incentives commonly take one of three forms: cash, shopping vouchers or lottery tickets. Thus, 'type of incentive' was included as an attribute with no reward, cash, shopping vouchers and lottery tickets as levels. Previous evidence suggests that 'total value' is a key determinant of acceptability.[30, 31] Levels within the 'total value' attribute were set based on the range found in our systematic review of effectiveness of financial incentives,[10] with some smoothing, of £15-£515 (~$US23-$793). We also included one very large incentive value (£1000; ~$US1540) to capture if people could be 'bought' into a behaviour at all or if even large amounts would not be effective in motivating a behaviour change.

Contingency Management Theory predicts that gradually increasing the value of incentives, as maintenance of behaviour progresses, leads to more sustained behaviour change.[41] This was captured in a 'schedule' attribute. Variable reward schedules can only apply to behaviours that are sustained. Thus, this attribute was not applied to screening and vaccination attendance.

Participants in qualitative studies exploring acceptability of financial incentives often spontaneously identify education, information and support as either alternatives, or complementary, to financial incentives.[26, 35] We therefore included 'other information provided' as an attribute with written information, face-to-face discussion or both as levels.

Finally, various potentially vulnerable groups – particularly pregnant women and people living in low income households - have been identified in both qualitative and quantitative work in whom financial incentives may be considered more acceptable.[11, 26, 35] 'Recipients' was, therefore, included as an attribute with all eligible people, those living in low income households, and pregnant women as levels.

Experimental design

The experimental design process is summarised in **Fig 1**. The combination of attributes and levels described in Table 1 would generate 576 unique scenarios (4x6x2x4x3) for smoking cessation and physical activity; and 288 for screening and vaccination (4x6x4x3) – 1728 in total for all four behaviours. This is too many to be considered by any one person. An efficient design was generated using Ngene software[42] to reduce the number of scenarios to the minimum required to estimate main effects and first order interactions, whilst minimising standard errors. This generated 24 pairs of experimental scenarios ('choice sets') for each behaviour – 96 across four behaviours and still too many for one person to consider. The 24 choice sets for each behaviour were randomly divided into four blocks of six. One block from each behaviour was then combined to produce four versions of the DCE, each containing 24 choice sets across four behaviours. Participants were randomly assigned to one of these versions.

Fig 1. schematic summary of experimental design process

Each choice set of experimental scenarios was combined with a third scenario including no incentive but both written information and an opportunity for a face-to-face discussion on the benefits of healthy behaviours and strategies for performing them (**Fig 2**). This represents what might be considered 'routine', if not 'best', practice for encouraging the healthy behaviours of interest in UK primary care. In all choice sets it was stated that all options were equally effective (to avoid any influence of effectiveness on acceptability) and that programmes would be carefully monitored to avoid 'gaming' (i.e. recipients feigning unhealthy behaviour in order to receive rewards for subsequent healthy behaviour).

178 **Fig 2. example choice set**

179 The full questionnaire included an introduction and instructions, 24 choice sets, and socio-
180 demographic and behavioural questions (age, gender, level of education, current smoking
181 status, and current physical activity level). The 24 choice sets were grouped by behaviour
182 with the order of behaviours randomly allocated across participants.

183 Pre-testing and data collection

184 The draft questionnaire was iteratively pre-tested and refined using cognitive interviewing
185 and the 'think aloud' technique.[43, 44] The first author worked through a paper version of
186 the questionnaire with adult volunteers asking them to comment on design, wording and
187 layout and answer all questions, explaining their thought processes as they did so. We
188 conducted three rounds of pre-testing with three participants in each round, making
189 changes to design, wording and layout after each round to maximise respondents'
190 understanding of the questionnaire.

191 Main data collection took place via an on-line survey and was conducted by a market
192 research company (ResearchNow) in winter 2014-2015. Participants were invited to take
193 part in the survey via a single-use, personalised, link sent in an email. These prevented
194 participants taking part more than once or sharing links with others.

195 Participants and sample size

196 All participants were aged 18 years or older, normally resident in the UK, and members of
197 ResearchNow's on-line panel. As per ResearchNow's normal procedures, participants
198 received small (£2; ~$US3) shopping voucher incentives to take part. Quota sampling was

used to maximise the representativeness of participants with quotas set for age, gender, educational attainment, smoking status and physical activity levels (with strata as detailed in **Table 2**) reflective of the current UK adult population. Respondents who did not complete the full questionnaire were excluded and additional participants recruited to replace them.

Table 2 – characteristics of participants, and comparison to UK adult population

Characteristic	Level	Study sample, n(%); (N=356)	UK adult population, %[a]
Age	18-29	49 (13.8)	17.6
	30-39	55 (15.5)	16.9
	40-49	77 (21.6)	18.4
	50-59	63 (17.7)	16.8
	60-69	62 (17.4)	14.3
	70-79	38 (10.7)	9.7
	80+	12 (3.4)	10.6
Gender	Male	181 (50.8)	49.2
	Female	175 (49.2)	50.8
Educational attainment	No qualifications	35 (9.8)	23.2
	Secondary school leaving qualifications (e.g. GCSE)	116 (32.6)	29.3
	University entry qualifications (e.g. A-levels, NVQ)	90 (25.3)	12.1
	University degree	114 (32.0)	27.0
Cigarette smoking	Current smoker	46 (12.9)	20.5
	Ex-smoker	72 (20.2)	25.5
	Never smoker	237 (66.6)	54.0
Physical activity	Regularly physically active[b]	85 (23.9)	37.5
	Not regularly physically active	270 (75.8)	62.5

[a]Data on age and gender distribution from 2014 mid-year estimates;[45] data on education attainment from 2011 Census;[46] data on cigarette smoking from Health Survey for England 2013;[47] data on physical activity from Health Survey for England 2012.[48]

[b]Moderately active for 30 minutes or longer on 5 or more days in last week

We aimed to collect data from 400 participants. Previous studies have highlighted the difficulties of DCE sample size calculations, as sample size calculations are dependent on knowledge of the true choice probabilities – which are not known prior to undertaking research.[38] Health-related DCEs have included samples ranging from 50[49] to almost 4000.[50] In practice, DCE sample size estimates are generally based on rules-of-thumb, such as a minimum of 10 observations per parameter, plus 50. With five attributes and up to four interaction terms (see below), this would give a minimum required sample size of 140. Thus, we estimated that our target sample of around 400 would be more than sufficient.

Data analysis

Data was analysed using a random utility model framework and conditional logistic regression to estimate the mean change in utility that respondents placed on attribute levels compared to the reference level (see **Box 1**). Results are presented as 'marginal utility values' for each attribute level, compared to a reference level. Marginal utility values indicate relative preferences for levels within an attribute (for example, relative preferences for cash, shopping vouchers, or lottery tickets compared to no reward). Positive marginal utility values indicate an attribute level is preferred more than the reference level and negative marginal utility values that the attribute level is preferred less than the reference level. Marginal utility values do not imply any quantifiable results other than a ranking of levels compared to a reference level according to the magnitude of the coefficient. P-values are used to identify which differences are statistically significant.

Box 1 – Data analysis

Data was analysed using a random utility model framework and conditional logistic regression to estimate mean change in utility, value or preference, which respondents placed on an attribute level

compared to the reference level. This assumes that the choices individuals make in a DCE reveal the utility they place on the alternatives presented. In a DCE it is assumed that an individual will choose an alternative in a given choice set if the utility derived from that alternative is greater than from any other alternative offered in the choice set.[51]

The utility derived from the alternative chosen is assumed to comprise of two parts: a systematic, observable component; and a stochastic, unobservable component.[52] This can be expressed as:

$U = V + \varepsilon$

Where:

U is the utility derived by an individual,

V is the observable component of this, and

ε is the unobservable component.

In practice, the observable component (V) is captured through the choices respondents make when answering DCE questions. Or:

$U = \alpha + \beta_1 X_1 + \beta_2 X_2 + \ldots + \beta_n(\alpha Z) + \varepsilon$

Where:

α is the alternative specific constant (ASC)

X are attributes included in the DCE

β are the parameters (or coefficients) to account for the marginal utility of that attribute

αZ are interaction terms between the ASC and individual characteristics (age, gender, education, smoking status, physical activity)

Interaction terms were used to explore whether preferences for attributes were correlated with each other (no such interactions were found); and whether preferences for attributes varied by respondents' age, gender, level of education or (in the case of preferences for smoking cessation and physical activity), current behaviour.

Ethics and data sharing

Ethical approval was obtained from Newcastle University's Faculty of Medicine's Research Ethics Committee (reference 00775_1). Participants were provided with written information on the study before deciding to take part and indicated their consent to take part by clicking a button before data collection took place. No personally identifying data were collected. As part of the written information and consent procedure, participants were informed that

239 their data would not be shared until three years after collection. For this reason we cannot
240 share data at this time.

241 Results

242 A total of 356 individuals completed the DCE and were included in the analysis – more than
243 twice as many as indicated by our sample size calculation. Data was missing on educational
244 attainment, cigarette smoking status and physical activity for one person. The sampling
245 quotas were not entirely achieved. Compared to the UK adult population, participants were
246 more likely to be aged 30-79 years, had a higher educational attainment, were less likely to
247 be current or ex-smokers, and less likely to be regularly physically active (Table 2).

248 Marginal utility values from the DCE are presented in **Table 3**. A statistically significant
249 positive marginal utility value for cash rewards in relation to vaccination indicates that cash
250 rewards were preferred to no rewards for vaccination. However, there were no statistically
251 significant differences in preferences for shopping voucher rewards compared to no
252 rewards for all behaviours, and for cash rewards compared to no rewards for all behaviours
253 except vaccination. In most cases, these rewards are as acceptable as no reward. In
254 contrast, statistically significant negative marginal utility values for lottery tickets across all
255 behaviours indicate that no reward was preferred to lottery ticket rewards in all cases.

256

257 **Table 3 – marginal utility values of attribute levels for financial incentives for four behaviours (N=356)**

Attribute	Level	Marginal utility value[1]							
		Smoking cessation		Regular physical activity		Attendance for vaccination		Attendance for screening	
		Unadjusted	Adjusted	Unadjusted	Adjusted	Unadjusted	Adjusted	Unadjusted	Adjusted
Type of incentive	No reward	Comparator	Comparator	Comparator	Comparator	Comparator	Comparator	Comparator	Comparator
	Cash	0.12	**1.25**[2]	0.22	**1.84**	0.19	**1.65**	**0.25**[2]	**1.64**
	Shopping vouchers	-0.02	**1.13**	-0.02	**1.66**	-0.06	**1.41**	0.002	**1.41**
	Lottery tickets	**-0.35**	**0.75**	**-0.35**	**1.34**	**-0.53**	**0.89**	**-0.38**	**0.98**
Total value	£UK	**-0.0004**	**-0.0004**	**-0.0003**	**-0.0003**	**-0.0002**	**-0.0002**	-0.0001	-0.0001
Schedule	Same value each week	Comparator	Comparator	Comparator	Comparator	Comparator	Comparator	Comparator	Comparator
	Value progressively increases	0.12	0.14	0.01	0.03	NA[3]	NA	NA	NA
Other info provided	No other information	Comparator	Comparator	Comparator	Comparator	Comparator	Comparator	Comparator	Comparator
	Written leaflet	**-0.35**	**-0.37**	**-0.33**	**-0.36**	0.06	0.22	0.06	**0.32**
	Face-to-face discussion	0.01	-0.03	-0.12	-0.17	0.18	**0.41**	**0.28**	**0.45**
	Written leaflet & face-to-face discussion	0.08	0.10	-0.04	-0.01	**0.38**	**-0.84**	**0.42**	**-0.87**
Recipients	All	Comparator	Comparator	Comparator	Comparator	Comparator	Comparator	Comparator	Comparator
	People living in low income households	**-0.49**	**-0.54**	**-0.41**	**-0.46**	**-0.46**	**-0.42**	**-0.46**	**-0.42**
	Pregnant women	**-0.49**	**-0.49**	**-0.65**	**-0.67**	**-0.82**	**-0.83**	**-0.85**	**-0.87**
Interactions	Option C x age	NA	**0.03**	NA	**0.04**	NA	**0.04**	NA	**0.04**
	Option C x gender (female)	NA	Comparator	NA	Comparator	NA	Comparator	NA	Comparator
	Option C x gender (male)	NA	**-0.30**	NA	**-0.35**	NA	**-0.42**	NA	**-0.59**
	Option C x education (no qualifications)	NA	Comparator	NA	Comparator	NA	Comparator	NA	Comparator
	Option C x education (secondary school)	NA	-0.03	NA	0.06	NA	-0.14	NA	**-0.38**
	Option C x education (university entry)	NA	**-0.29**	NA	-0.09	NA	**-0.46**	NA	**-0.53**
	Option C x education (university degree)	NA	-0.14	NA	0.10	NA	-0.11	NA	-0.13
	Option C x smoking status (never)	NA	Comparator	NA	NA	NA	NA	NA	NA
	Option C x smoking status (current)	NA	-0.18	NA	NA	NA	NA	NA	NA
	Option C x smoking status (ex-smoker)	NA	-0.03	NA	NA	NA	NA	NA	NA
	Option C x physical activity (not active)[4]	NA	NA	NA	Comparator	NA	NA	NA	NA
	Option C x physical activity (active)[5]	NA	NA	NA	**-0.25**	NA	NA	NA	NA
Log-likelihood		-2189	-2123	-2211	-2114	-2102	-1995	-2141	-2020

For all models: number of observations: 6,408; number of choice sets: 2,136; number of respondents: 356.

[1]Marginal utility values indicate relative preferences for levels within an attribute. Positive values indicate an attribute level is preferred more than the comparator and negative values that the comparator is preferred more than the level of interest. P-values identify which differences are statistically significant; [2]Bold typeface indicates statistically significant at $p<0.05$; [3]NA: not applicable; [4]Not moderately active for 30 minutes or longer on 5 or more days in last week; [5]Moderately active for 30 minutes or longer on 5 or more days in last week

263 Incentives of lower value were weakly preferred to those of higher value, except in the case
264 of screening where there was no difference in preference based on incentive value.
265 Respondents had no preferences in terms of whether incentives for longer term behaviour
266 change were the same amount each week or escalated as behaviour change was sustained.

267 Respondents preferred that incentives were not accompanied by written information for
268 physical activity and smoking; but that they were accompanied by both written information
269 and face-to-face discussions for vaccination and screening. There was a universal, and
270 strong, preference for incentives offered to all eligible individuals, rather than those
271 targeted at individuals living in low income households or pregnant women.

272 A small number of participants consistently chose the 'routine practice' option over either
273 of the financial incentive scenarios. As shown by the interaction terms in Table3, these
274 people tended to be older, women, and have attained university entry-level qualifications.
275 Adjusting the analysis to take account of consistently choosing the routine care option
276 changed results in relation to 'type of incentive' (with all rewards becoming preferable to no
277 reward), but not in respect of other attributes. This suggests that those who consistently
278 chose 'routine practice' had a general dis-preference for financial incentives in general,
279 rather than any particular attribute of financial incentives.

280 No interactions were found between preferences for different attributes. However, some
281 preferences did vary according to respondents' socio-demographic characteristics. For all
282 four behaviours, model goodness of fit measured by the log-likelihood ratio statistic
283 improved when controlling for individual characteristics (age, gender, education) and
284 current behaviour where information was available (smoking status, physical activity). **Table**
285 **4** shows how preferences varied by age, gender and level of education for the attributes

where main effects were found in Table 3: type of incentive, information provided, and recipients. Older participants were consistently more likely than younger participants to prefer no reward compared to all types of incentives. They were also more likely than younger participants to prefer incentives accompanied by written information and face-to-face discussions and financial incentives offered to all, rather than targeted at particular groups.

Table 4 – interactions between socio-demographics and marginal utility values of attribute levels for financial incentives for four behaviours (N=356)

		Smoking cessation					Regular physical activity				
Attribute	Level	Age	Male gender[a]	No qualifications[b]	Secondary school[b]	University entry[b]	Age	Gender	No qualifications	Secondary school	University entry
Type of incentive	No reward	Comparator	Comparator	Comparator	Comparator	Comparator	Comparator	Comparator	Comparator	Comparator	Comparator
	Cash	-[c]	+[d]	NS[e]	+	NS	-	+	-	NS	NS
	Shopping vouchers	-	NS	NS	NS	NS	-	+	NS	NS	NS
	Lottery tickets	-	NS	NS	NS	NS	-	+	NS	NS	NS
Other information provided	No other information	Comparator	Comparator	Comparator	Comparator	Comparator	Comparator	Comparator	Comparator	Comparator	Comparator
	Written leaflet	NS	NS	NS	NS	NS	-	NS	NS	NS	NS
	Face-to-face discussion	NS	NS	NS	NS	NS	-	+	NS	NS	NS
	Written & face-to-face	+	NS	NS	NS	NS	+	NS	NS	NS	NS
Recipients	All	Comparator	Comparator	Comparator	Comparator	Comparator	Comparator	Comparator	Comparator	Comparator	Comparator
	Low income households	-	+	NS	NS	NS	-	+	NS	NS	NS
	Pregnant women	-	NS	NS	NS	NS	-	NS	NS	NS	NS
		Attendance for vaccination					Attendance for screening				
Type of incentive	No reward	Comparator	Comparator	Comparator	Comparator	Comparator	Comparator	Comparator	Comparator	Comparator	Comparator
	Cash	-	+	NS	+	NS	-	+	NS	+	NS
	Shopping vouchers	-	+	NS	+	NS	-	+	NS	+	NS
	Lottery tickets	-	+	NS	+	NS	-	+	NS	+	+
Other information provided	No other information	Comparator	Comparator	Comparator	Comparator	Comparator	Comparator	Comparator	Comparator	Comparator	Comparator
	Written leaflet	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
	Face-to-face discussion	-	+	NS	NS	NS	-	NS	NS	NS	NS
	Written & face-to-face	+	-	NS	NS	NS	+	-	NS	NS	NS
Recipients	All	Comparator	Comparator	Comparator	Comparator	Comparator	Comparator	Comparator	Comparator	Comparator	Comparator
	Low income households	-	NS	NS	NS	NS	-	+	NS	NS	NS
	Pregnant women	-	NS	NS	NS	NS	-	+	NS	NS	NS

[a]Versus female gender; [b]Versus university degree; [c]Statistically significant negative interaction ($p<0.05$); [d]Statistically significant positive interaction ($p<0.05$); [e]NS: not statistically significant

Male participants were more likely than female participants to prefer any financial incentive to no reward for all behaviours except smoking cessation, and to prefer cash incentives to no reward for smoking cessation. Men were also more likely than women to prefer face-to-face information for physical activity and attendance for vaccination; and incentives targeted at those living in low income households for all behaviours except attendance for vaccination. There were few consistent differences in preference according to level of education.

Discussion

Summary of findings

We conducted a DCE exploring the relative preferences of UK adults for characteristics of financial incentive interventions for healthy behaviours. Uniquely, we asked all participants to answer questions on financial incentives for four different health behaviours in order to compare how preferences varied between behaviours. Unlike previous work, we also explored socio-demographic determinants of preferences.

In the majority of cases, participants considered cash or voucher incentives equally preferable to no incentive (the exception was a significant preference for cash compared to no incentive for attendance for vaccination). However, there was a consistent preference for no financial incentive compared to a lottery ticket incentive. In general, preferences for financial incentives were inversely related to incentive value. Participants preferred financial incentives available to everyone rather than those targeted only at pregnant women or people living in low-income households. Additional written and face-to-face information

316 alongside financial incentives was preferred for vaccination and screening, but not for
317 smoking and physical activity.

318 A number of consistent differences in preferences were seen according to age and gender,
319 but not educational level of participants. In general, younger people were more likely than
320 older people to prefer any financial incentive to none, incentives targeted to pregnant
321 women or people living in low-income households, and incentives provided without any
322 additional information. Men were more likely than women to prefer any incentive to none,
323 face-to-face discussions alongside incentives for some behaviours, and incentives targeted
324 at those living in low-income households.

325 Strengths & limitations of methods

326 The use of an on-line market research panel is equivalent to a convenience sample. This may
327 not be representative of the population, limiting the generalisability of results. This
328 constitutes a significant limitation of the work. We chose to use this sample because
329 previous DCEs using more population-representative sampling frames (e.g. from the
330 electoral roll) have resulted in very low response rates – which are leads to limited
331 representativeness.[53] It is also worth noting that even sampling frames such as the UK
332 electoral roll are acknowledged to be biased.[54] By using quota sampling we attempted to
333 ensure that participants reflected the UK adult population in terms of age, gender,
334 educational attainment, smoking status and physical activity. However, our quotas were not
335 always attained. Participants were less likely to be at the extremes of age; were more
336 educated; less likely to currently, or have ever, smoked; and less likely to be regularly

physically active than the population as a whole. Despite this, the sample was diverse enough to identify differences in preference according to age and gender.

Personalised, single-use links to the survey sent to participants via email prevented individuals taking part in the survey more than once or sharing links with others.

External validity is a substantial concern of DCEs[55, 56] – it is not clear that respondents' preferences stated during an on-line survey reflect their true preferences if faced with similar choices in real life. However, in the absence of large scale financial incentive programmes, and observed evidence on acceptability, DCEs can provide valuable preliminary information and improve the understanding of behaviours and triggers to behaviour change. Checks for internal validity showed that the estimated parameters were consistent with findings from the literature. Less than 1% of responses consistently chose only Option A or Option B, indicating that that they did not consider trade-offs between the presented scenarios. Thus, the majority of participants appear to have engaged constructively with the task. However, we were unable to distinguish between personal preferences for what participants would like for themselves, and what they would like for society as a whole.

We determined attributes, and levels, of interest from a range of previous research, including a systematic review[11] and focus group interviews.[26] Furthermore, we ensured that all experimental scenarios were realistic and plausible in the UK context. This reflects best practice in DCEs[38, 39] and increases the relevance of our work to both participants and policymakers.

We excluded a number of potentially important attributes that may influence acceptability of financial incentives. In particular, we asked respondents to consider scenarios that were described as equally effective, and closely monitored to minimise 'gaming'. One previous DCE found that acceptability of financial incentives increased as stated effectiveness increased.[36] This finding is endorsed by other research.[11, 26] Whilst there is little evidence in practice of 'gaming' financial incentive interventions,[57, 58] it is a common concern in qualitative work.[26-28] We excluded both effectiveness and gaming as attributes from the DCE because we felt that both an effective intervention and one where gaming was monitored and minimised were prerequisites of a realistic intervention.

Interpretation of findings

The finding that, in most cases, there was no difference in preference for cash or voucher incentives versus no incentive suggests that financial incentives may not be as unacceptable as previously reported.[11, 24, 26, 27, 35] Indeed, cash incentives were even preferred to no incentives for screening. This may reflect differences in participant groups. Alternatively, it is possible, although unconfirmed, that social desirability bias operates in some research settings such that people feel it would be 'improper' or 'greedy' to endorse financial incentives in face to face settings. Social desirability bias may be less likely to operate in more anonymous on-line settings.[35] A perception that it is inappropriate to endorse financial incentives may be particular to the UK context where health care does not involve any financial transactions. There is some indication that financial incentives may be more publically acceptable in settings where paying for health care is normalised.[11]

The strong negative preference for lottery-type incentives is interesting given how common these are in research settings, particularly in the USA, and in Quit & Win contests.[10, 22] Our results suggest that lottery incentives for healthy behaviours are unlikely to be acceptable to the UK public. It is not clear if and how cultural and contextual factors influence acceptability of lottery incentives and whether lottery incentives are more acceptable in the USA than the UK – although the prevalence of these type of incentives in the USA suggests so. There is some evidence that UK respondents feel it is 'unfair' to be encouraged to take up a healthy behaviour in return for an incentive that you are not certain of receiving.[26]

Our finding of strong negative preferences for incentives targeted at pregnant women or those living in low income households may offer further insight into the negative preference for lottery incentives. Lottery incentives – where only some people who perform the behaviour receive the reward – may be seen as conceptually similar to those targeted at only some population groups. Again, these results may be specific to the UK context where universal entitlement to health care is well established. Future work could directly compare differences in acceptability of financial incentives according to differences in health-care and other aspects of context and culture. Few, if any, attempts have been made to establish if financial incentives are more effective in those living in less socio-economically affluent circumstances.[10] Further research is required to confirm if the effectiveness of financial incentives varies by socio-economic position and how such a finding could be acceptability operationalised.

In qualitative work, pregnant women and those living in low-income households are perceived as most responsive to, and deserving of, financial incentives.[26, 35] This finding

402 is reflected in recent UK research which has focused on financial incentives for
403 breastfeeding and smoking cessation in pregnancy.[28, 37, 58] However, a preference for
404 targeted incentives was not borne out here. It is possible that in some circumstances
405 research participants answer questions on the acceptability of financial incentives from the
406 perspective of society ('how would I feel if financial incentives were being offered in the
407 UK?'), whilst in other circumstances they answer from the perspective of themselves ('how
408 would I feel if I were offered a financial incentive?'). Preferences may vary between these
409 two perspectives. Future work should attempt to de-couple preferences for financial
410 incentives from societal and personal perspectives.

411 The weak preference for lower value incentives, for smoking, physical activity and
412 vaccination, is superficially counter-intuitive. However, this could reflect a common
413 academic concern that external rewards undermine intrinsic motivation – i.e. incentivised
414 behaviours become less attractive.[59] Although a recent analysis suggests that there is
415 little evidence that 'crowding out' of internal motivation does occur in relation to financial
416 incentives for healthy behaviours,[60] this has not yet been widely recognised. Qualitative
417 research also reveals concerns that higher value financial incentives are unaffordable in the
418 current financial climate,[26, 27, 35] and this may explain a preference for lower value
419 incentives. There is very little cost-effectiveness evidence on financial incentives for healthy
420 behaviours. However, one study found incentives for smoking cessation in pregnancy had an
421 incremental cost per quality-adjusted life-year of only £482 (~$US744), suggesting they are
422 highly cost-effective.[61]

423 We found no differences in preferences in relation to incentive schedule. It has been
424 suggested that escalating incentive values is one way to ensure longer term behaviour

change.[41] Participants may have considered this a subtlety – particularly as they were explicitly told that both scenarios in each choice set were equally effective.

We included the attribute of additional information because participants in qualitative studies often emphasise the importance of providing education and information on behaviour change as either an alternative to, or alongside, financial incentives.[26, 27, 35] In the current work we found no specific preference for additional written information or opportunities for face-to-face discussions about behaviours for physical activity and smoking cessation. In contrast, there was a positive preference for face-to-face discussions with written information alongside financial incentives for attendance for both vaccination and screening. Respondents may feel that there is less debate over the benefits of smoking cessation[62] and regular physical activity than attending for screening or vaccination;[63-66] and hence that it is more appropriate to discuss these latter behaviours.

Consistent interactions were found between age and gender and preferences for characteristics of financial incentives. Older people were less likely than younger people to prefer any incentive over none, more likely to prefer additional written information and face-to-face discussions alongside incentives, and more likely to prefer incentives available to all, rather than targeted at particular groups. In a cross-sectional sample, it is difficult to know if these differences reflect cohort effects or true age effects. Men were more likely than women to prefer any financial incentive over none, and incentives targeted particularly at those living in low-income households over universal incentives. These age and gender differences may reflect political ideology, with men and older people in the UK being more likely to support right-wing political parties[67] – which promote individual responsibility and less government interference in everyday lives.

Interestingly, there were no clear or consistent differences in preferences for financial incentives according to level of education. This contrasts with clear educational and socio-economic differences in many health related attitudes and behaviours.[47, 68]

Implications of findings for policy, practice and research

Our results suggest that financial incentives for healthy behaviours are, in general, no less acceptable to the UK public than no incentives. To maximise acceptability, incentives should be in the form of cash or shopping vouchers, and not lotteries; be of low value; and available to all. Incentives for smoking cessation and physical activity would be more acceptable if not accompanied by additional information, whereas combining incentives with written information and the opportunity for face-to-face discussion would be more acceptable for vaccination and screening.

Future research could explore the reasons for some of the differences in preferences reported here compared to qualitative research findings. It is also important to identify how generalisable our results are beyond the UK, and to distinguish between preferences for incentives from the personal and societal point of view. Further information is also required on the cost-effectiveness of financial incentives.

Conclusions

Preferences amongst UK adults for programmes promoting smoking cessation, physical activity, vaccination and screening did not vary according to whether or not a financial incentive was offered. Financial incentives offering lottery-type rewards and those only available to some population groups were not considered acceptable. Preferences for

469 additional information provided alongside incentives varied between behaviours. Older
470 participants were less likely to prefer any incentive, more likely to prefer additional written
471 information and face-to-face discussions alongside incentives, and more likely to prefer
472 incentives available to all, rather than targeted at particular groups. Men were more likely
473 to prefer any financial incentive over none, and incentives targeted particularly at those
474 living in low-income households over universal incentives. There were no clear differences
475 in preference according to educational attainment.

References

1. Forouzanfar MH, Alexander L, Anderson HR, Bachman VF, Biryukov S, Brauer M, et al. Global, regional, and national comparative risk assessment of 79 behavioural, environmental and occupational, and metabolic risks or clusters of risks in 188 countries, 1990–2013: a systematic analysis for the Global Burden of Disease Study The Lancet. 2013. doi: 10.1016/S0140-6736(15)00128-2.

2. Lim SS, Vos T, Flaxman AD, Danaei G, Shibuya K, Adair-Rohani H, et al. A comparative risk assessment of burden of disease and injury attributable to 67 risk factors and risk factor clusters in 21 regions, 1990-2010: a systematic analysis for the Global Burden of Disease Study 2010. Lancet. 2012;380(9859):2224-60. Epub 2012/12/19. doi: 10.1016/s0140-6736(12)61766-8. PubMed PMID: 23245609; PubMed Central PMCID: PMCPmc4156511.

3. Murray CJL, Richards MA, Newton JN, Fenton KA, Anderson HR, Atkinson C, et al. UK health performance: findings of the Global Burden of Disease Study 2010. The Lancet. 2013;381(9871):997-1020. doi: 10.1016/S0140-6736(13)60355-4.

4. Public Health England. Influenza immunisation programme for England GP patient groups. Data collection survey. Season 2014 to 2015. London: 2015.

5. Centre for Cancer Prevention. Breast screening results from the NHS breast screening programme (England, Wales, Scotland & Northern Ireland) 2012/13. London: Queen Mary University of London, 2014.

6. World Health Organization. 2008-2013 Action Plan for the Global Strategy for the Prevention and Control of Noncommunicable Diseases. Geneva: World Health Organization, 2008.

7. Secretary of State for Health. Healthy lives, healthy people: our strategy for public health in England. London: HM Government, 2010.

8. US Department of Health & Human Services, Office of Disease Prevention and Health Promotion. Healthy People 2020. Washington DC: 2010.

9. Marteau T, Ashcroft R, Oliver A. Using financial incentives to achieve healthy behaviour. BMJ. 2009;338. doi: 10.1136/bmj.b1415.

10. Giles E, Robalino S, McColl E, Sniehotta F, Adams J. Systematic review, meta-analysis and meta-regression of the effectiveness of financial incentives for encouraging healthy behaviours. PLoS One. 2014;9(3):e90347.

11. Giles E, Robalino S, Sniehotta F, Adams J, McColl E. Acceptability of financial incentives for encouraging uptake of healthy behaviours: A critical review using systematic methods. Prev Med. 2015;doi: 10.1016/j.ypmed.2014.12.029.

12. Abraham C, Michie S. A taxonomy of behaviour change techniques used in interventions. Health Psychol. 2008;27:379-87.

13. Adams J, Giles E, McColl E, Sniehotta F. Carrots, sticks, and health behaviours: a framework for documenting the complexity of financial incentive interventions to change health behaviours. Health Psychol Rev. 2014;8(3):286-95.

14. Lagarde M, Haines A, Palmer N. Conditional Cash Transfers for Improving Uptake of Health Interventions in Low- and Middle-Income Countries: A Systematic Review. JAMA. 2007;298(16):1900-10. doi: 10.1001/jama.298.16.1900.

15. Madison K, Schmidt H, Volpp KG. SMoking, obesity, health insurance, and health incentives in the affordable care act. JAMA. 2013;310(2):143-4. doi: 10.1001/jama.2013.7617.

16. Mantzari E, Vogt F, Shemilt I, Wei Y, Higgins JP, Marteau TM. Personal financial incentives for changing habitual health-related behaviors: A systematic review and meta-analysis. Prev Med. 2015;75:75-85. Epub 2015/04/07. doi: 10.1016/j.ypmed.2015.03.001. PubMed PMID: 25843244.

17. Kane R, Johnson P, Town R, Butler M. A structured review of the effect of economic incentives on consumers' preventive behavior. Am J Prev Med. 2004;27:327-52.

18. Kavanagh J, Stansfield C, Thomas J. Incentives to improve smoking, physical activity, dietary and weight management behaviours: a scoping review of the research evidence. London: Institute of Education, University of London, 2009.

19. Sutherland K, Christianson JB, Leatherman S. Impact of Targeted Financial Incentives on Personal Health Behavior: A Review of the Literature. Med Care Res Rev. 2008;65(6_suppl):36S-78. doi: 10.1177/1077558708324235.

533 20. Wall J, Ni Mhurchu C, Blakely T, Rodgers A, Wilton J. Effectiveness of Monetary
534 Incentives in Modifying Dietary Behavior: A Review of Randomized, Controlled Trials. Nutr
535 Rev. 2006;64(12):518-31.

536 21. Wigham S, Ternent L, Bryant A, Robalino S, Sniehotta F, Adams J. Effectiveness,
537 acceptability, and economic costs and consequences of parental financial incentives and
538 quasi-mandatory schemes for increasing uptake of vaccinations in pre-school children:
539 systematic review and meta-analysis. Pediatrics. 2014;134(4):e1117 -e28 (doi:
540 10.542/peds.2014-1279).

541 22. Cahill K, Perera R. Competitions and incentives for smoking cessation. Cochrane
542 Database of Systematic Reviews. 2011;4:CD004307.

543 23. Strohacker K, Galarraga O, Williams DM. The impact of incentives on exercise
544 behavior: a systematic review of randomized controlled trials. Ann Behav Med.
545 2014;48(1):92-9. Epub 2013/12/07. doi: 10.1007/s12160-013-9577-4. PubMed PMID:
546 24307474; PubMed Central PMCID: PMCPmc4412849.

547 24. Popay J. Should disadvantaged people be paid to take care of their health? No. BMJ.
548 2008;337. doi: 10.1136/bmj.a594.

549 25. Giles EL, Adams JM. Capturing public opinion on public health topics: a comparison
550 of experiences from a systematic review, focus group study, and analysis of online, user-
551 generated content. Frontiers in Public Health. 2015;3. doi: 10.3389/fpubh.2015.00200.

552 26. Giles E, McColl E, Sniehotta F, Adams J. Acceptability of financial incentives and
553 penalties for encouraging uptake of healthy behaviours: focus groups. BMC Public Health.
554 2015;15(58):doi:10.1186/s12889-015-1409-y.

555 27. Giles E, Holmes M, McColl E, Sniehotta F, Adams J. Acceptability of financial
556 incentives for breastfeeding: thematic analysis of readers' comments to UK online news
557 reports. BMC Pregnancy Childbirth. 2015;15(1):116. Epub 2015/05/20. doi: 10.1186/s12884-
558 015-0549-5. PubMed PMID: 25982305.

559 28. Whelan B, Thomas K, Van Cleemput P, Whitford H, Strong M, Renfrew M, et al.
560 Healthcare providers' views on the acceptability of financial incentives for breastfeeding: a
561 qualitative study. BMC Pregnancy Childbirth. 2014;14:355.

562 29. De Bekker-Grob E, Ryan M, Gerard K. Discrete choice experiments in health
563 economics: a review of the literature. Health Econ. 2010;DOI: 10.1002/hec.1697.

564 30. Farooqui MA, Tan YT, Bilger M, Finkelstein EA. Effects of financial incentives on
565 motivating physical activity among older adults: results from a discrete choice experiment.
566 BMC Public Health. 2014;14:141. Epub 2014/02/12. doi: 10.1186/1471-2458-14-141.
567 PubMed PMID: 24512102; PubMed Central PMCID: PMCPmc3933254.

568 31. Hashemi A, You W, Boyle K, Parmeter C, Kanninen B, Estabrooks P. Identifying
569 Financial Incentive Designs to Enhance Participation in Weight Loss Programs. Journal of
570 Obesity & Weight Loss Therapy. 2015;5(1):247.

571 32. Ryan M, Netten A, Skatun D, Smith P. Using discrete choice experiments to estimate
572 a preference-based measure of outcome--An application to social care for older people.
573 Journal of Health Economics. 2006;25:927-44.

574 33. Flynn T, Louviere J, Marley A, Coast J, Peters T. Rescaling quality of life values from
575 discrete choice experiments for use as QALYs: a cautionary tale. Population Health Metrics.
576 2008;6.

577 34. Coast J, Flynn T, Natarajan L, Sproston K, Lewis J, Louviere J, et al. Valuing the ICECAP
578 capability index for older people. Social Science & Medicine`. 2008;67:874-82.

579 35. Adams J, Bateman B, Becker F, Cresswell T, Flynn D, McNaughton R, et al.
580 Effectiveness and acceptability of parental financial incentives and quasi-mandatory
581 schemes for increasing uptake of vaccinations in preschool children: systematic review,
582 qualitative study, and discrete choice experiment. Health Technol Assess. 2015;19(94):1-
583 176.

584 36. Promberger M, Dolan P, Marteau T. "Pay them if it works": discrete choice
585 experiments on the acceptability of financial incentives to change health related behaviour.
586 Social Science & Medicine`. 2012;75(12):2509-14.

587 37. Hoddinott P, Morgan H, Thomson G, Crossland N, Farrar S, Yi D, et al. The push me,
588 pull you of financial incentives and health inequalities: a mixed methods study investigating
589 smoking cessation in pregnancy and breastfeeding. The Lancet. 2014;384:S37. doi:
590 10.1016/S0140-6736(14)62163-2.

591 38. Lancsar E, Louviere J. Conducting discrete choice experiments to inform healthcare
592 decision making. Pharmacoeconomics. 2008;26(8):661-77.

593 39. Ryan M, Gerard K, Amaya-Amaya M, editors. Using Discrete Choice Experiments to
594 Value Health and Health Care: Springer; 2008.

595 40. Coast J, Al-Janabi H, Sutton EJ, Horrocks SA, Vosper AJ, Swancutt DR, et al. Using
596 qualitative methods for attribute development for discrete choice experiments: issues and
597 recommendations. Health Econ. 2012;21(6):730-41. doi: 10.1002/hec.1739.

598 41. Roll JM, Higgins ST, Badger GJ. An experimental comparison of three different
599 schedules of reinforcement of drug abstinence using cigarette smoking as an exemplar. J
600 Appl Behav Anal. 1996;29(4):495-505.

601 42. ChoiceMetrics. Ngene 1.1.1. Australia2012.

602 43. Willis G. Cognitive Interviewing: a "how to" guide. Rockville, MD: Research Triangle
603 Institute, 1999.

604 44. Willis G. Cognitive Interviewing. A Tool for Improving Questionnaire Design.
605 Thousand Oaks: Sage Publications; 2005.

606 45. Office for National Statistics. MYE1: Population Estimates Summary for the UK, mid-
607 2014 (MYE8ST1). Fareham: 2015.

608 46. Office for National Statistics. 2011 Census: Highest level of qualification, local
609 authorities in the United Kingdom (QS501UK). Fareham: 2013.

610 47. Craig R, Mindell J. Health Survey for England 2013, volume 1: Health, social care and
611 lifestyles. London: Health and Social Care Information Centre, 2014.

612 48. Craig R, Mindell J. Health Survey for England 2012, volume 1: Health, social care and
613 lifestyles. London: Health and Social Care Information Centre, 2013.

614 49. Dwight-Johnson M, Lagomasino I, Aisenberg E, Hay J. Using conjoint analysis to
615 assess depression treatment preferences among low-income Latinos. Psychiatr Serv.
616 2004;55(8):934-6.

617 50. Scott A, Watson M, Ross S. Eliciting preferences of the community for out of hours
618 care provided by general practitioners: a stated preference discrete choice experiment. Soc
619 Sci Med. 2003;56(4):803-14.

620 51. Lancsar E, Savage E. Deriving welfare measures from discrete choice experiments:
621 inconsistency between current methods and random utility and welfare theory. Health
622 Econ. 2004;13(9):901-7. Epub 2004/09/14. doi: 10.1002/hec.870. PubMed PMID: 15362181.

623 52. Hicks RL, Strand IE. The Extent of Information: Its Relevance for Random Utility
624 Models. Land Economics. 2000;76(3):374-85. doi: 10.2307/3147035.

625 53. Ryan M, Yi D, Avenell A, Douglas F, Aucott L, van Teijlingen E, et al. Understanding
626 preferences for lifestyle interventions to reduce obesity: should we pay people to live well?
627 Sixth Annual Scientific Meeting of the UK Society for Behavioural Medicine; Leeds, UK2010.

628 54. Wilks-Heeg S. Electoral registration in the United Kingdom: A literature review for
629 the Cabinet Office Electoral Registration Transformation Programme. Liverpool: 2012.

630 55. Lancsar E, Swait J. Reconceptualising the external validity of discrete choice
631 experiments. Pharmacoeconomics. 2014;32(10):951-65. Epub 2014/06/13. doi:
632 10.1007/s40273-014-0181-7. PubMed PMID: 24920196.

633 56. Krucien N, Gafni A, Pelletier-Fleury N. Empirical Testing of the External Validity of a
634 Discrete Choice Experiment to Determine Preferred Treatment Option: The Case of Sleep
635 Apnea. Health Econ. 2015;24(8):951-65. Epub 2014/07/06. doi: 10.1002/hec.3076. PubMed
636 PMID: 24986760.

637 57. Ierfino D, Mantzari E, Hirst J, Jones T, Aveyard P, Marteau T. Financial incentives for
638 smoking cessation in pregnancy: a single-arm intervention study assessing cessation and
639 gaming. Addiction. 2015;DOI: 10.1111/add.12817.

640 58. Tappin D, Bauld L, Purves D, Boyd K, Sinclair L, MacAskill S, et al. Financial incentives
641 for smoking cessation in pregnancy: randomised controlled trial. BMJ. 2015;350:h134.

642 59. Deci E, Koestner R, Ryan R. A meta-analytic review of experiments examining the
643 effects of extrinsic rewards on intrinsic motivation. Psychol Bull. 1999;125:627-68.

644 60. Promberger M, Marteau T. When Do Financial Incentives Reduce Intrinsic
645 Motivation? Comparing Behaviors Studied in Psychological and Economic Literatures. Health
646 Psychol. 2013;32(9): 950-7.

647 61. Boyd KA, Briggs AH, Bauld L, Sinclair L, Tappin D. Are financial incentives cost-
648 effective to support smoking cessation during pregnancy? Addiction. 2015. Epub
649 2015/09/16. doi: 10.1111/add.13160. PubMed PMID: 26370095.

650 62. Lader D, Meltzer H. Smoking related behaviours and attitudes, 2002. London: Office
651 of National Statistics, 2003.

652 63. Bish A, Yardley L, Nicoll A, Michie S. Factors associated with uptake of vaccination
653 against pandemic influenza: A systematic review. Vaccine. 2011;29:6472-84.

654 64. Brown KF, Kroll JS, Hudson MJ, Ramsay M, Green J, Long SJ, et al. Factors underlying
655 parental decisions about combination childhood vaccinations including MMR: A systematic
656 review. Vaccine. 2010;28(26):4235-48. doi: 10.1016/j.vaccine.2010.04.052.

657 65. Falagasa M, Zarkadouliaa E. Factors associated with suboptimal compliance to
658 vaccinations in children in developed countries: a systematic review. Curr Med Res Opin.
659 2008;24(6):1719-41.

660 66. Mills E, Jadad AR, Ross C, Wilson K. Systematic review of qualitative studies exploring
661 parental beliefs and attitudes toward childhood vaccination identifies common barriers to
662 vaccination. J Clin Epidemiol. 2005;58(11):1081-8. doi: 10.1016/j.jclinepi.2005.09.002.

663 67. Ipsos MORI. How Britain voted in 2015: The 2015 election – who voted for whom?
664 London2015 [cited 2016 18 January]. Available from: https://www.ipsos-
665 mori.com/researchpublications/researcharchive/3575/How-Britain-voted-in-
666 2015.aspx?view=wide.

667 68. Wardle J, Steptoe A. Socioeconomic differences in attitudes and beliefs about
668 healthy lifestyles. J Epidemiol Community Health. 2003;57:440-3.