

Greater fruit selection following an appearance-based compared with a health-based health promotion poster

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ABSTRACT

Background This study investigated the impact of an appearance-based compared with a traditional health-based public health message for healthy eating.

Methods A total of 166 British University students (41 males; aged 20.6 ± 1.9 years) were randomized to view either an appearance-based ($n = 82$) or a health-based ($n = 84$) fruit promotion poster. Intentions to consume fruit and immediate fruit selection (laboratory observation) were assessed immediately after poster viewing, and subsequent self-report fruit consumption was assessed 3 days later.

Results Intentions to consume fruit were not predicted by poster type (largest $\beta = 0.03$, $P = 0.68$) but were associated with fruit-based liking, past consumption, attitudes and social norms (smallest $\beta = 0.16$, $P = 0.04$). Immediate fruit selection was greater following the appearance-based compared with the health-based poster ($\beta = -0.24$, $P < 0.01$), and this effect remained when controlling for participant characteristics ($\beta = -0.21$, $P < 0.01$). Subsequent fruit consumption was greater following the appearance-based compared with the health-based poster ($\beta = -0.22$, $P = 0.03$), but this effect became non-significant on consideration of participant characteristics ($\beta = -0.15$, $P = 0.13$), and was instead associated with fruit-based liking and past consumption (smallest $\beta = 0.24$, $P = 0.03$).

Conclusions These findings demonstrate the clear value of an appearance-based compared with a health-based health promotion poster for increasing fruit selection. A distinction between outcome measures and the value of a behavioural measure is also demonstrated.

Keywords appearance, behaviour, body weight, fruit, health, intentions

Introduction

Limited resources, pressing alternatives and increasing requirement continue to fuel a need for effective low-cost, population-applicable interventions for improving health behaviours, including healthy eating.^{1,2} Poor diet in the UK alone is currently estimated to cost an annual £6 billion,³ and estimates suggest that small population-wide changes can have significant impacts on health.^{4–6} Low-cost, population-applicable interventions typically exist in the form of health promotion messages,⁷ where minimal information is intended to motivate as broad a population as possible. These messages almost invariably use long-term health, chronic disease or mortality as primary motivators for behaviour change, e.g. ‘smoking kills’.⁷ These strategies, however, have enjoyed limited success.^{8–12} Evaluations often suggest increases in knowledge, both of the message and of the risks, but minimal

change in actual behaviour.⁸ These findings suggest that while the information provision is effective, a motivational aspect may still be lacking.

Some information-based interventions for health behaviours are currently achieving success. These interventions continue to provide information, but use appearance as a primary motivator as opposed to health. For example, Jones and Leary¹³ found increased safe sun behaviours after reading an essay on effects of sun exposure on appearance compared with an essay on health risks or a control essay, Mahler *et al.*¹⁴ found less skin darkening and more sun protective behaviours following provision of UV photographs and photoaging

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information compared with control, and studies successfully using appearance-based motivators for changing other health behaviours are also available.^{15,16} These studies demonstrate the value of appearance as a potential motivator for health behaviours. The interventions used, however, remain more complex, more costly and are potentially less far-reaching than simple health promotion messages.

This study investigated the value of a simple health promotion message for healthy eating based on an appearance-related motivator—body weight. Body weight was used as an appearance-related motivator due to known associations between healthy eating and body weight,¹⁷ and the absence of other well-evidenced, appearance-based associations for healthy eating. There are health- and appearance-related implications to body weight, but appearance-related considerations are often considered more influential in concerns over body weight, than are health implications.¹⁸ The impact of the appearance-based poster for healthy eating was compared with that of a poster using a traditional health-based motivator—heart health. We hypothesized that viewing an appearance-based health promotion poster would result in increased intentions to consume fruit, increased fruit selection and increased subsequent fruit consumption, compared with viewing a traditional health-based health promotion poster.

Methods

Design

Using an independent-groups design, 166 participants were randomly assigned to view either an appearance-based ($n = 82$) or a health-based ($n = 84$) health promotion poster, and intentions to consume fruit, immediate fruit selection and subsequent fruit consumption were assessed.

Participants

One hundred and sixty-six British University students (41 males; aged 20.6 ± 1.9 years) took part in the study. British University students were recruited as a group with generally poor healthy eating practices, including low fruit and vegetable consumption,^{19–21} that is likely to benefit from long-term healthy eating habits and weight control strategies,^{19,20} that are also likely to be motivated by appearance.^{19,20} Young adults, therefore, provide an appropriate population to test our hypothesis.²² To increase ecological validity, all participants who volunteered for the study were invited to take part (there were no exclusion criteria). Participants were unaware of the true purpose of the study, and to reduce demand characteristics, information sheets promoted the study as investigating ‘individual preferences for posters for a range of health behaviours’. Ethical approval for the study was given by the Research Ethics

Committee of Bournemouth University, UK, prior to commencement, and the study was conducted with full adherence to the Ethical Principles of the British Psychological Society.

Health promotion posters

Two health promotion posters were used for the study. Both posters consisted of a central message and a large coloured central picture surrounded by smaller coloured pictures of fruit. For the health-based poster, the central message stated ‘*Eat fruit and help your heart!*’, and the central picture was of a human heart. For the appearance-based poster, the central message stated ‘*Eat fruit and help your waist!*’, and the large central picture was of the waist of a person of a healthy weight surrounded by a tape measure (no actual measurement provided). Fruit consumption was used as the health behaviour of interest due to known associations between fruit consumption and both heart health and body weight,^{4–6,17} and the relative ease with which fruit consumption can be measured as a measure of health eating.²³ The inclusion of the tape measure in the appearance-based poster was also intended to enhance the appearance- as opposed to the health-based nature of the body weight message. Both posters were identical, except the central message and picture.

Intentions to consume fruit, immediate fruit selection and subsequent fruit consumption

Intentions to consume fruit were assessed using two intention questionnaire items—‘I intend to eat fruit tomorrow’ and ‘I am likely to eat fruit tomorrow’, responded to on a 7-point Likert scale anchored from ‘strongly disagree’ to ‘strongly agree’. Immediate fruit selection was assessed by offering participants a choice of one of 12 snacks: 4 items of fruit—2 apples, 2 bananas; 4 fruit-based biscuit bars—2 *Apple* Kellogg’s Nutrigrain bars, 2 *Strawberry* Kellogg’s Nutrigrain bars; 4 non-fruit-based biscuit bars—2 *Golden Oats* Kellogg’s Eleveses, 2 *Ginger Bake* Kellogg’s Eleveses; on completion of the study as a token of thanks. The biscuit bars were considered comparable to the fruit snacks in usual use and deliberately did not include chocolate, to avoid selection of certain snacks specifically as a reward or treat. Snack selection was observed covertly by the researcher, prior to the participant leaving the laboratory. No snack was also permitted as a choice. Subsequent consumption was assessed by self-report 3 days later by email, in response to an email requesting ‘number of portions of fruit consumed yesterday’.

Participant characteristics of potential impact on fruit consumption

Various other participant characteristics of potential impact on fruit consumption^{23–31} were also assessed using additional

questionnaire items, and subsequently controlled for to prevent confounding:—gender, age, usual motivation through appearance or health-based concerns ('How important is your health to you?' (not at all—extremely important), 'I try to keep in good health' (strongly disagree—strongly agree), 'I wish I was more healthy' (strongly disagree—strongly agree), 'How important is your appearance to you?' (not at all—extremely important), 'I make an effort to look good' (strongly disagree—strongly agree), 'I wish my looks were better' (strongly disagree—strongly agree)); liking for fruit ('I like fruit' (strongly disagree—strongly agree)); usual fruit consumption ('On an average week day, how many portions of fruit do you eat?', 'On an average weekend day, how many portions of fruit do you eat?'); past fruit consumption ('Yesterday, how many portions of fruit did you eat?'); social norms ('I would be affected if someone criticized my diet' (strongly disagree—strongly agree), 'What other people think of my diet matters to me' (strongly disagree—strongly agree)); attitudes towards fruit consumption ('My snacking on fruit later today would be: unpleasant—pleasant; unenjoyable—enjoyable; worthless—valuable; harmful—beneficial'); perceived behavioural control ('How much control do you feel over whether or not you snack on fruit today?' (none at all—complete control), 'I feel in complete control of whether or not I snack on fruit later today' (strongly disagree—strongly agree)) and self-efficacy ('If I wanted to, I would not have problems succeeding to snack on fruit later today' (strongly disagree—strongly agree), 'How confident are you that you could snack on fruit later today?' (not at all—completely confident)). The Theory of Planned Behaviour (TPB)²⁴ was used as a theoretical framework for the study, hence, the use of some particular constructs, but the study was not a specific test of the TPB. Attitudes, perceived behavioural control and self-efficacy were assessed after poster viewing as possible routes through which the posters may impact on intentions. All other participant characteristics were assessed prior to poster viewing. Usual fruit consumption and past fruit consumption were measured in portions consumed per day. All other questionnaire items were responded to on a 7-point Likert scale, summed where appropriate, and scaled to result in a score from 0 to 1 (low to high) per characteristic. Usual motivation was summed and scaled to result in a score from -1 to +1, where negative scores represented motivation by appearance-based concerns (by degree) and positive scores represented motivation by health-based concerns (by degree). To reduce demand characteristics, alongside promotion of the study as investigating individual preferences, a range of distractor questions were also included throughout the questionnaire. Distractor questions included questions on poster perception and preferences, artistic abilities and preferences, and other aspects of diet and lifestyle. All questions and measures were based on previous publications.^{23–31}

Procedure

Participants undertook the study individually, in the Eating Behaviours Unit of Bournemouth University, UK, from November 2012 to February 2013. All instructions and questionnaire items were provided using an online survey tool (SurveyMonkey—www.surveymonkey.com). Participants completed all aspects of the study in the following order: (i) read all instructions and provide informed consent; (ii) complete questions on gender, age and usual motivation through appearance- or health-based concerns, liking for fruit, usual fruit consumption, past fruit consumption, social norms, plus some distractor questions; (iii) view a health promotion poster; (iv) complete questions on intentions to consume fruit, attitudes towards fruit consumption, perceived behavioural control and self-efficacy, plus some distractor questions; (v) select a snack as a token of thanks (no selection was also permitted); (vi) return an email response to an email sent 3 days later; (vii) receive a debrief and explanation of the study by return email (or 2 weeks after study completion if an email response had not been received). Participants were given as long as they wished to complete the study while in the Unit, which included as long as they wished to view the poster. Unlimited time was given to again increase the ecological validity of the study. Poster viewing, however, was ensured by the required repetition of the central message and completion of several questions on poster perception as part of the subsequent questionnaire ('What is the message on the poster?', 'The message on the poster is clear' (strongly agree—strongly disagree), 'The poster is attractive' (strongly agree—strongly disagree)). Responses to the follow-up email were limited to a 5-day period, to ensure direct relevance to the study. Email responses received after 5 days (and so over 1 week after poster viewing) were discarded and not used for analysis. Poster randomization was undertaken by a researcher with no direct contact with participants using a coin toss, prior to each participant's entry into an individual study booth, and remained concealed from both researchers with direct contact with participants during all outcome assessments. Two researchers were in direct contact with participants: young, female and of a healthy weight. Participants were not blinded to poster message but were blinded to the possible alternatives. Similar procedures have been published previously.^{23,31}

Analyses

Effects of poster type were investigated using multiple linear regression, where intentions to consume fruit, immediate fruit selection and subsequent self-report consumption were predicted by poster type (Model 1) and poster type plus all participant characteristics (Model 2).³² To allow regression analyses to be conducted, intentions to consume fruit were scored on a

7-point scale; for immediate fruit selection, snacks selected were converted into number of portions of fruit selected where fruit = 1, fruit-based biscuit bars = 0.5 and non-fruit-based biscuit bars = 0; and subsequent self-report fruit consumption was recorded as number of portions. Cronbach's alpha demonstrated reliability for all questionnaire scales (smallest $\alpha = 0.81$), and correlations revealed no concerns over multicollinearity (largest $r = 0.57$). Sample sizes were based on planned regression analyses.³² All participants provided questionnaire data and were included in analyses on intentions to consume fruit. All responding participants were included in subsequent analyses (immediate fruit selection, subsequent self-report fruit consumption). Sample sizes were lower than intended for subsequent fruit consumption (target $n = 110$), but the pattern of findings was verified by repetition of the analyses with the two variables of least contribution removed.

Results

In total, 82 participants were randomized to view the appearance-based poster and 84 participants were randomized to view the health-based poster. Details of all participant characteristics and poster perceptions are given in Table 1. No differences were found between groups in any of the baseline participant characteristics or in poster perceptions (largest $t(164) = 1.17$, $P = 0.24$).

All 166 participants correctly reported the message from the poster that they viewed and provided data on intentions to

consume fruit, all participant characteristics and poster perceptions. A total of 154 participants chose a snack at the end of the study and so provided data on immediate fruit selection, and 94 participants responded by email within the specified time frame to provide data on subsequent self-report fruit consumption. Descriptive statistics for intentions to consume fruit, immediate fruit selection and subsequent self-report fruit consumption are given in Table 2.

Results of analyses on intentions to consume fruit, fruit selection and fruit consumption are given in Table 3.

Intentions to consume fruit were not predicted by poster type (Model 1: $\beta = 0.03$, $P = 0.74$; Model 2: $\beta = 0.03$, $P = 0.68$). Greater intentions were associated with increased liking for fruit ($\beta = 0.23$, $P < 0.01$), increased past fruit consumption ($\beta = 0.16$, $P = 0.04$), more positive attitudes toward fruit ($\beta = 0.18$, $P = 0.02$) and more positive social norms ($\beta = 0.22$, $P < 0.01$).

Immediate fruit selection was greater following the appearance-based compared with the health-based poster ($\beta = -0.24$, $P < 0.01$) and remained significant when other participant characteristics were also considered ($\beta = -0.21$, $P = 0.01$). Fruit selection was not predicted by any other characteristic (largest $\beta = 0.15$, $P = 0.15$).

Subsequent self-report fruit consumption was also greater following the appearance-based compared with the health-based poster ($\beta = -0.22$, $P = 0.03$), although this effect became non-significant when other participant characteristics were also considered ($\beta = -0.15$, $P = 0.10$). Greater fruit

Table 1 Descriptive statistics for all participant characteristics and poster perceptions and preferences, by poster type

Poster type	Appearance-based poster (n = 82)			Health-based poster (n = 84)		
	Mean	SD	Range	Mean	SD	Range
Gender (male/female)	17/62 (21%/79%)			24/60 (29%/71%)		
Age (years)	20.5	1.3	18–25	20.8	2.4	18–32
Usual motivation (scored –1 to 0 to +1) ^a	0.03	0.2	–0.5 to 0.4	0.03	0.2	–0.4 to 0.7
Liking for fruit (scored 0–1) ^b	0.9	0.2	0–1	0.9	0.2	0–1
Usual fruit consumption (portions/day)	2.7	1.6	0–10	2.9	1.7	0–8
Past fruit consumption (portions/day)	2.2	1.8	0–10	2.1	1.4	0–7
Social norms (scored 0–1) ^b	0.5	0.3	0–1	0.5	0.3	0–1
Poster attractive ^b	0.7	0.2	0–1	0.7	0.2	0–1
Poster informative ^b	0.6	0.2	0–1	0.7	0.2	0–1
Attitudes towards fruit (scored 0–1) ^b	0.8	0.1	0.5–1	0.8	0.1	0.5–1
Perceived behavioural control (scored 0–1) ^b	0.8	0.2	0–1	0.9	0.2	0.3–1
Self-efficacy (scored 0–1) ^b	0.8	0.2	0.3–1	0.8	0.2	0.5–1

^aQuestionnaire items were responded to on a 7-point Likert scale, summed and scaled to result in a score from –1 to +1, where negative scores represented motivation by appearance-based concerns (by degree) and positive scores represented motivation by health-based concerns (by degree).

^bQuestionnaire items were responded to on a 7-point Likert scale, summed where appropriate, and scaled to result in a score from 0 to 1 (low to high).

Table 2 Descriptive statistics for intentions to consume fruit, immediate fruit selection and subsequent self-report fruit consumption, by poster type

Poster type	Appearance-based poster (n = 82)			Health-based poster (n = 84)		
Intentions to consume fruit (scored 0–1) ^a	0.7	0.2	0–1	0.7	0.2	0–1
Immediate fruit selection ^b	n = 76			n = 78		
Fruit (number)	43 (52%)			25 (30%)		
Fruit-based biscuit bars (number)	21 (26%)			30 (36%)		
Non-fruit-based biscuit bars (number)	12 (15%)			23 (27%)		
Subsequent self-report fruit consumption ^c	n = 52			n = 42		
Fruit consumption (portions/day)	2.8	2.0	0–6	2.1	1.3	0–5

^aQuestionnaire items were responded to on a 7-point Likert scale, summed where appropriate, and scaled to result in a score from 0 to 1 (low to high).

^bChoice of no snack was also possible—sample sizes represent individuals choosing a snack.

^cSample sizes represent individuals responding within 7 days of participation in the study.

consumption was then associated with increased fruit liking ($\beta = 0.24$, $P = 0.03$) and increased past fruit consumption ($\beta = 0.34$, $P < 0.01$).

Discussion

Main findings of this study

Immediate fruit selection was greater following the appearance-based compared with the health-based poster, and this effect remained when other participant characteristics were also considered. Subsequent fruit consumption was also greater following the appearance-based poster, although the impact of the poster became non-significant on inclusion of other participant characteristics, and subsequent fruit consumption was better associated with liking for fruit and past fruit consumption. Intentions to consume fruit were not predicted by poster type but were associated with liking for fruit, past fruit consumption, attitudes towards fruit and social norms.

What is already known on this topic

Low-cost, population-applicable interventions for improving healthy eating are available,^{1,2} but typically impact only minimally on behaviour change.^{8–12} For other health behaviours, appearance-based interventions are demonstrating some success,^{13–16} but as far as we are aware, no work has investigated

Table 3 Results of linear regression analyses on intentions to consume fruit ($n = 166$), immediate fruit selection ($n = 154$) and subsequent self-report fruit consumption ($n = 94$), following an appearance-based compared with a health-based poster

	Intentions to consume fruit		Immediate fruit selection		Subsequent self-report fruit consumption	
	β	Sig.	β	Sig.	β	Sig.
Model 1						
Poster type (appearance/health)	0.03	0.74	-0.24	<0.01	-0.22	0.03
Model 2						
Poster type (appearance/health)	0.03	0.68	-0.21	0.01	-0.15	0.10
Gender (male/female)	0.07	0.27	-0.03	0.69	0.05	0.61
Age (years)	0.00	0.98	-0.04	0.67	0.07	0.47
Usual motivation (scored -1 to 0 to +1) ^a	0.06	0.34	0.09	0.30	-0.05	0.58
Liking for fruit (scored 0–1) ^b	0.23	<0.01	-0.09	0.34	0.24	0.03
Usual fruit consumption (portions/day)	0.12	0.11	-0.06	0.55	0.15	0.16
Past fruit consumption (portions/day)	0.16	0.04	0.15	0.15	0.34	<0.01
Attitudes towards fruit (scored 0–1) ^b	0.18	0.02	-0.12	0.21	0.11	0.34
Social norms (scored 0–1) ^b	0.22	<0.01	0.06	0.50	-0.05	0.62
Perceived behavioural control (scored 0–1) ^b	0.15	0.07	-0.03	0.78	-0.22	0.06
Self-efficacy (scored 0–1) ^b	0.09	0.24	0.12	0.27	-0.12	0.34

Emboldened values are significant ($P < 0.05$).^aQuestionnaire items were responded to on a 7-point Likert scale, summed and scaled to result in a score from -1 to +1, where negative scores represented motivation by appearance-based concerns (by degree) and positive scores represented motivation by health-based concerns (by degree).

^bQuestionnaire items were responded to on a 7-point Likert scale, summed where appropriate, and scaled to result in a score from 0 to 1 (low to high).

the impact of a low-cost, population-applicable, appearance-based intervention for improving healthy eating.

What this study adds

This study demonstrates the clear value of an appearance-based compared with a health-based health promotion poster for increasing immediate fruit selection and potentially also for increasing subsequent consumption.

Explanations for the effect are unknown, but can be suggested based on the various differences between appearance-based and health-based concerns. For example, appearance may be easier to observe and self-monitor by the average individual, than other health-related outcomes such as cardiovascular risk factors, such as high blood pressure, arterial plaques and constricted arteries.¹⁸ The gradual progress of changes to appearance may also be more observable than those for health, possibly allowing these conditions to act as more immediate or short-term concerns.^{33,34} Explanations and mechanisms were not tested here, but this testing would clearly be of interest.

The pattern of results across the different measures in this study is also interesting. Immediate fruit selection was impacted only by poster type, subsequent fruit consumption was impacted by poster type, but more so by liking and past behaviour, and intentions to consume fruit were impacted, not by poster type, but by liking, past behaviour and other constructs of the TPB. This pattern of results suggests firstly that all three outcome variables are very different, and secondly that measures of intentions may reflect habitual behaviours and cognitive processes;^{28,29} that immediate selection may be less considered, more spontaneous and more open to immediate change and that subsequent consumption is largely habitual, but may also be open to change. The value of the TPB for predicting intentions is well known,²⁴ but poor correspondence between intentions and behaviours is also well recognized.^{18,28,29} The importance of habit in both intentions and consumption has also been demonstrated previously.^{28,29}

The pattern of results across the different measures also demonstrates the value of the measure of immediate selection. Many studies investigating information-based interventions include no measure of behaviour,^{28,29} but the value of the measure of immediate behaviour in this study is clear. The health benefit of this behaviour and its potential repetition should also be recognized, suggesting potential impact not just in the short term, but also in the long term. While effects are only apparent once here, it is feasible that repeated presentation of a health promotion poster, such as would occur if a health promotion poster were placed outside a workplace canteen, could result in the repeated immediate selection of

fruit, which could have significant impact on health.^{4–6,28,29} Habituation to a poster or poster message, however, could also occur, resulting in reduced effects over time.³⁵ Investigation in the long term, and in more naturalistic, settings is clearly required. Investigation of other aspects of healthy eating of impact on appearance and health (e.g. vegetable consumption) or of other health behaviours (e.g. physical activity) would also be of interest. The use of more long-term objective measures of health may also be desirable.

Limitations of this study

Methodology is unlikely to explain the effects found, given the use of an independent-groups design, randomization, a cover study suggesting many posters, and the similarity of the conditions.^{23,31} Effects due to individual differences, thus, are unlikely to systematically impact on one group more than another. BMI, for example, and body satisfaction were not measured as part of the study (and this measurement may have even added a confound by increasing the salience of body weight), but the distribution of body weight and body satisfaction are unlikely to differ systematically between groups. A demonstration of effects due to appearance may be particularly likely in the population sampled (young and predominantly females),^{19,34} but there are benefits in improving fruit selection in this group. This group was specifically chosen to demonstrate effects, and the use of this group does not negate the potential importance of the effects found. Now that an effect has been demonstrated here, study in alternative groups is also warranted. A no poster condition, or a condition related to an alternative health behaviour,^{23,31} may also have been beneficial. An examination of participants' guesses regarding the purpose of the study would also verify successful participant blinding, and further controls or records, for example of amount of time spent viewing the poster, may aid in understanding mechanisms.

Possible negative effects as a result of fruit promotion or an appearance-based motivator were not considered. The study was intended as an investigation of the possible use of appearance to motivate healthy eating, using a population-orientated health promotion strategy. It is accepted that some individuals may be adversely affected by fruit consumption, due to specific medical conditions, or appearance-related messages, due to high concerns over body image. None of the participants in this study were adversely impacted by the poster which they viewed, but no formal measure of adverse events was undertaken, and sensitivity to possible detrimental impacts is recommended. Inclusion of measures of adverse events in further studies would be desirable, and perception of the messages by a variety of individuals would be of interest.

Conclusions

In conclusion, this study demonstrates clear benefit from an appearance-based compared with a health-based health promotion poster for healthy eating in a predominantly young, female, adult sample. Further work is required to examine effects in real-world settings, over the long term, and for other health behaviours also known to impact on appearance. This study also demonstrates clear value of the use of behavioural measures in research on health behaviours.

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