

This item was submitted to [Loughborough's Research Repository](#) by the author.
Items in Figshare are protected by copyright, with all rights reserved, unless otherwise indicated.

Promoting stair climbing: effects of message specificity and validation

PLEASE CITE THE PUBLISHED VERSION

<http://her.oxfordjournals.org/content/22/1/49.abstract>

PUBLISHER

© The Author. Published by Oxford University Press

VERSION

AM (Accepted Manuscript)

LICENCE

CC BY-NC-ND 4.0

REPOSITORY RECORD

Webb, Oliver J., and Frank F. Eves. 2019. "Promoting Stair Climbing: Effects of Message Specificity and Validation". figshare. <https://hdl.handle.net/2134/8923>.

This item was submitted to Loughborough's Institutional Repository (<https://dspace.lboro.ac.uk/>) by the author and is made available under the following Creative Commons Licence conditions.



CC creative commons
COMMONS DEED

Attribution-NonCommercial-NoDerivs 2.5

You are free:

- to copy, distribute, display, and perform the work

Under the following conditions:

 **Attribution.** You must attribute the work in the manner specified by the author or licensor.

 **Noncommercial.** You may not use this work for commercial purposes.

 **No Derivative Works.** You may not alter, transform, or build upon this work.

- For any reuse or distribution, you must make clear to others the license terms of this work.
- Any of these conditions can be waived if you get permission from the copyright holder.

Your fair use and other rights are in no way affected by the above.

This is a human-readable summary of the [Legal Code \(the full license\)](#).

[Disclaimer](#) 

For the full text of this licence, please go to:
<http://creativecommons.org/licenses/by-nc-nd/2.5/>

Promoting Stair Climbing: Effects of Message Specificity and Validation

Health Education Research, 2007; 22: 49-57

Oliver J. Webb, Frank F. Eves

Abstract

Current exercise guidelines encourage the daily accumulation of lifestyle activities, such as stair climbing. Although several studies show that visual prompts can increase stair usage, there has been little systematic assessment of the messages employed. Some of the messages used in previous interventions represent general descriptions of stair climbing (e.g., *'free exercise'*), whilst others emphasise specific consequences of stair use (e.g., *'keeps you fit'*). Twelve hundred structured interviews were conducted in order to establish which type of message is more persuasive. In addition, half of the interviewees were told that the messages were true, in order to assess how validating messages may influence their persuasive appeal. Results suggest that messages focussing on specific consequences are more persuasive than those providing general descriptions, and that validating the information presented in stair climbing interventions may increase their efficacy. Previous messages may not, therefore, have demonstrated the full potential of stair climbing as a model for increasing population activity levels.

Introduction

Physical activity reduces the risk of morbidity and mortality.^{1,2} In industrialised nations, however, up to three quarters of the population do not achieve recommended activity levels.^{3,4} Overambitious exercise guidelines from the early 1990s failed to engage the general population.⁵ Consequently, recommendations have been broadened to endorse thirty minutes of moderate intensity activity per day, which may be accumulated in several bouts.²

The change in exercise guidelines coincides with the emergence of a Socio-Ecological model in physical activity promotion.⁶⁻¹⁰ This approach recognises that the environment and policy decisions can have a major impact on physical activity, in addition to intrapersonal factors (e.g., psychological and biological variables) and interpersonal processes (e.g., social support). Hence, there is a shift in emphasis, from determinants of individual exercise participation to how the built environment may influence physical activity at a *population* level.

Within this framework, interventions to promote stair climbing exemplify how the modification of the environment can increase population activity levels.¹⁰ Posters installed at the 'point-of-choice' between stairs and escalators increased stair climbing by 50%-129% in shopping and commuter venues.¹¹⁻¹⁵ Message banners attached to the stair-risers themselves produced even greater effects, increasing stair climbing by 127%-179%.¹⁶⁻¹⁹ Opportunities for stair use are abundant and accessible for most population groups. Hence, stair climbing is acknowledged as a good means of accumulating physical activity.^{3,20} In addition, stair climbing is a physiologically vigorous activity and thus associated with several health benefits.²¹⁻²³

Point-of-choice prompts can be considered a method of mass health communication.

Regrettably, previous mass-media campaigns promoting physical activity have often been ineffective.²⁴ One possible explanation is that they are based on an overly simplistic approach to health communication, which assumes that messages have direct and homogenous effects on audience behaviour.²⁵ As Finlay and Faulkner point out, whilst detailed consideration is given to the *type* of media employed, the actual *content* of campaigns is often inadequately explored.²⁶ Indeed, previous stair climbing interventions demonstrate little scrutiny of the messages used. Only one intervention pre-tested materials in the field.¹⁶ Two convenience samples (n=161 and n=156) were asked to select messages according to their accuracy and ability to encourage stair use. An initial schedule of 49 messages was reduced to 16 for the second sample, from which the eight top selections were used. Elsewhere, messages appear to have been spontaneously composed by the investigators, with minimal input from the target audience.^{11-15,17-19}

The emerging wisdom in health communication is that the public are active ‘consumers’ of information.²⁵ Therefore, whilst point-of-choice prompts target physical activity at a population level, it is important not to neglect intrapersonal effects which may influence the public’s response to the intervention. Specifically, the content of the messages themselves may influence individuals’ motivation to engage in stair use. There has been extensive research into message features which can influence persuasiveness. These include message length²⁷, the number and order of arguments presented^{28,29}, tailoring^{30,31} and message framing.³¹⁻³³ By contrast, there has been less scrutiny of how the particular type of information contained in a message influences its persuasiveness. One variable which has thus far been neglected is the *specificity* of the message content.

Messages used in earlier stair climbing interventions typically fall into two categories.¹¹⁻¹⁹ Some represent general descriptions of stair climbing (e.g., *'free exercise'*, *'easy exercise'*), whereas others emphasise specific consequences (e.g., *'keeps you fit'*, *'exercises your heart'*). Recent research suggests that the most feasible campaign format may only involve a single message.¹⁹ It is, therefore, important to determine the most effective message type so that single theme campaigns can be prepared. Whilst few studies have formally addressed the issue of specificity, Roberson, Collins & Oreg found evidence that specific messages have greater motivational properties.³⁴ Participants read one of two messages advertising a hypothetical job vacancy. A message detailing the specific rewards of the post was associated with greater intention to apply than a message describing the position in more general terms.

There are theoretical reasons for believing that messages focussing on specific consequences may be more influential than those offering a general description of physical activity. The Theory of Planned Behaviour (TPB) posits that the primary antecedent of future behaviour is intention.³⁵ In the physical activity domain the major determinants of intention are attitudes and perceived behavioural control, with a smaller contribution from social pressure.^{36,37}

Physical activity campaigns have sought to change behaviour by targeting the belief component of attitude. In the TPB attitudinal beliefs are operationalised as the expected *outcome* of a behaviour (e.g., If I exercise this month it will keep me fit) multiplied by the value ascribed to that outcome. Hence, messages which focus on specific consequences should resonate more strongly with individuals' attitudinal beliefs, which in turn determine intention to engage in physical activity. Importantly, messages which emphasise positive consequences are also 'gain-framed' and so should help facilitate preventive behaviours such as physical activity.^{31-33,38} The first aim of this study was to formally compare the general

description messages and specific consequence messages used in four earlier interventions, to establish which type are more likely to encourage stair use.¹⁶⁻¹⁹

Persuasion literature shows that the perceived credibility of a message influences its effectiveness. Perhaps unsurprisingly, the quality of the arguments contained in a message has been found to influence the favourability of resulting attitudes.^{28,29,39} In addition, many studies have looked beyond the message itself; revealing that greater credibility of the message *source* is associated with higher motivation.^{29,32,40} Hence, the persuasiveness of a message is influenced by the audience's confidence in both the content of the message and the party delivering the message. In previous stair climbing interventions, however, it is not possible to deduce the *extent* to which people agreed with the information presented. Thus, whilst interventions provide strong evidence that point-of-choice prompts work in general, it is possible that they had sub-optimal effects because some people lacked belief in the messages used. Therefore, the second aim of this study was to examine if validating messages, by telling participants that they were true, increased their motivational potential.

In summary, this study formally assessed the motivational properties of eight messages previously used in successful stair climbing interventions.¹⁶⁻¹⁹ We hypothesised that general descriptions of stair climbing would be rated less motivating than specific consequences. Second, we predicted that telling participants the messages were true would enhance their motivational potential.

Method

Design

A replicated design was used in order to control for random sampling effects. The study was thus repeated with two separate samples of 600 participants. Given that the same personnel and standardised interview schedules were employed, any difference in results between samples could be attributed to sampling error. Therefore, only effects which were present in *both* samples were considered robust and included in discussion.

Procedure

Ethical approval for the study was granted by the University of Birmingham Ethics Sub-Committee. Two interview schedules (A and B) were composed based on stair climbing messages used in previous interventions.¹⁶⁻¹⁹ In both schedules respondents were read two general description messages and two specific consequence messages, all beginning with the stem "*Regular stair climbing*". Schedule A included the descriptions "*provides daily exercise*" and "*helps to keep you active*", and the consequences "*keeps you fit*" and "*helps to keep you healthy*". Schedule B included the descriptions "*is free exercise*" and "*is the easy way to exercise*", and the consequences "*works your legs*" and "*exercises your heart*". Respondents were asked to rate how much they agreed with each message (agreement rating). Ratings were made on a five point scale with the verbal labels '1 = not at all', '2 = a little', '3 = moderately', '4 = a lot' and '5 = very much'. Using the same scale, respondents were then asked to rate how much each message would encourage them to use the stairs (motivation rating).

Data were collected over three weeks in a UK town square. Investigators (n=4), introducing themselves as from the sport and exercise science department of a local university, approached a convenience sample of people and asked them to complete a brief interview. Participation was entirely voluntary and anonymous. Interview schedules A and B were conducted with 300 people respectively, making a total cohort of 600 (56% female; 8% over 60 years old). In order to examine the effects of validating the messages, participants in each interview schedule were equally divided between a validation group (Told True) and a comparison group (Told Nothing). True randomisation is difficult in field studies, thus allocation of participants between conditions was non-random in order to avoid possible errors in coding and assignment. After providing agreement ratings, respondents in the Told True group were informed that all the messages were true, prior to supplying motivation ratings. Investigators also coded participants' age (grey hair and/or appearance over 60 years old) and gender (inter-observer reliability = 95%).

The study was then replicated in the same location with a further 600 interviewees (47% female; 13% over 60 years old). Over three weeks schedules A and B were again administered to 300 participants respectively. As before, half of the respondents in each interview schedule were told that the messages were true, prior to giving motivation ratings.

Analysis

In the first sample 23 participants from schedule A and 11 participants from schedule B were excluded from analysis due to incomplete data. Similarly, in sample two 12 participants were omitted from schedule A.

The messages presented in interview schedule A were fully independent from those presented in interview schedule B. Hence, in each sample schedules A and B were analysed separately. Agreement and motivation ratings were entered as the dependent variable in a 2 X 2 X 2 X 2 mixed model MANOVA with the between-subjects factor of Group (Told Nothing vs. Told True). The three within-subjects variables were Rating Type (agreement vs. motivation), Message Type (general description vs. specific consequence) and individual Message. Results for the respective interview schedules were then compared across samples. Using the replicated study design significant effects were only reported if robust across samples. As no participants responded to both interview schedules there can be no *formal* comparison between schedules; suffice to say that any disparities must reflect the different items which they contain.

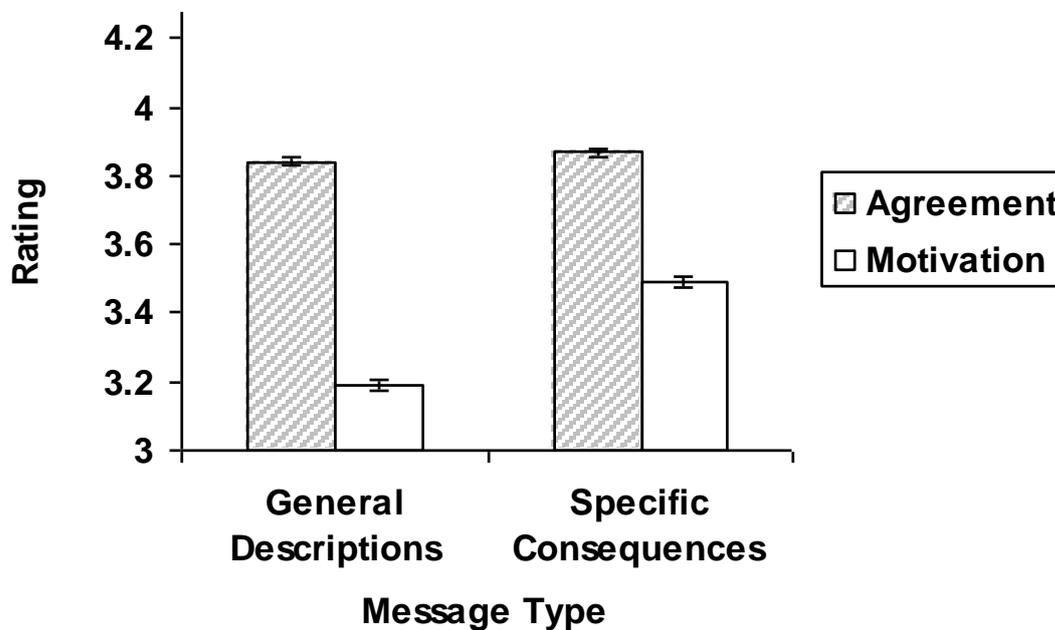
Results

Preliminary analyses including the between-subjects factors of Gender and Age revealed no robust interactions or main effects involving either factor. Hence, there was no evidence of differential responses resulting from the demographics of participants. Critically, there were also no robust interactions involving the Message variable, meaning that it is not possible to discuss the effects of individual messages.

There was no main effect of Group in any of the analyses, confirming that respondents in the validation (Told True) and comparison (Told Nothing) conditions were homogenous cohorts. Figure 3.1 shows agreement and motivation ratings collapsed across samples and interview schedules. As can be seen, motivation ratings were generally lower than agreement ratings. Further inspection of the figure, however, suggests an interaction between Rating Type and

Message Type. Whilst agreement ratings were similar for general descriptions and specific consequences, respondents rated specific consequences as more likely to motivate them into using the stairs. This interaction was significant in both schedule A [sample 1: $F(1, 275) = 17.20, p < .001$; sample 2: $F(1, 286) = 7.11, p < .01$] and schedule B [sample 1: $F(1, 287) = 29.49, p < .001$; sample 2: $F(1, 298) = 39.40, p < .001$].

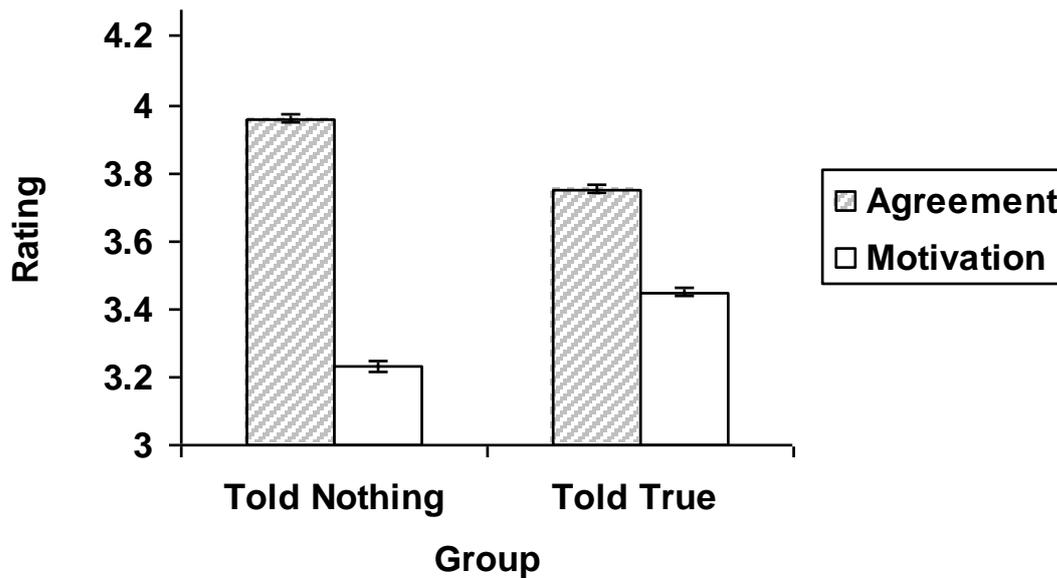
Figure 3.1. Agreement and motivation ratings for general description messages versus specific consequence messages (collapsed across all respondents)



Analyses also revealed a significant interaction between Rating Type and Group, both in schedule A [sample 1: $F(1, 275) = 18.38, p < .001$, sample 2: $F(1, 286) = 11.25, p < .01$] and schedule B [sample 1: $F(1, 287) = 9.70, p < .01$; sample 2: $F(1, 298) = 14.28, p < .001$]. Figure 3.2 summarises the interaction across all respondents. As can be seen, there was an apparent elevation of motivation in the group that were told the statements were true relative to the comparison group. Although the figure also suggests a disparity in agreement ratings between

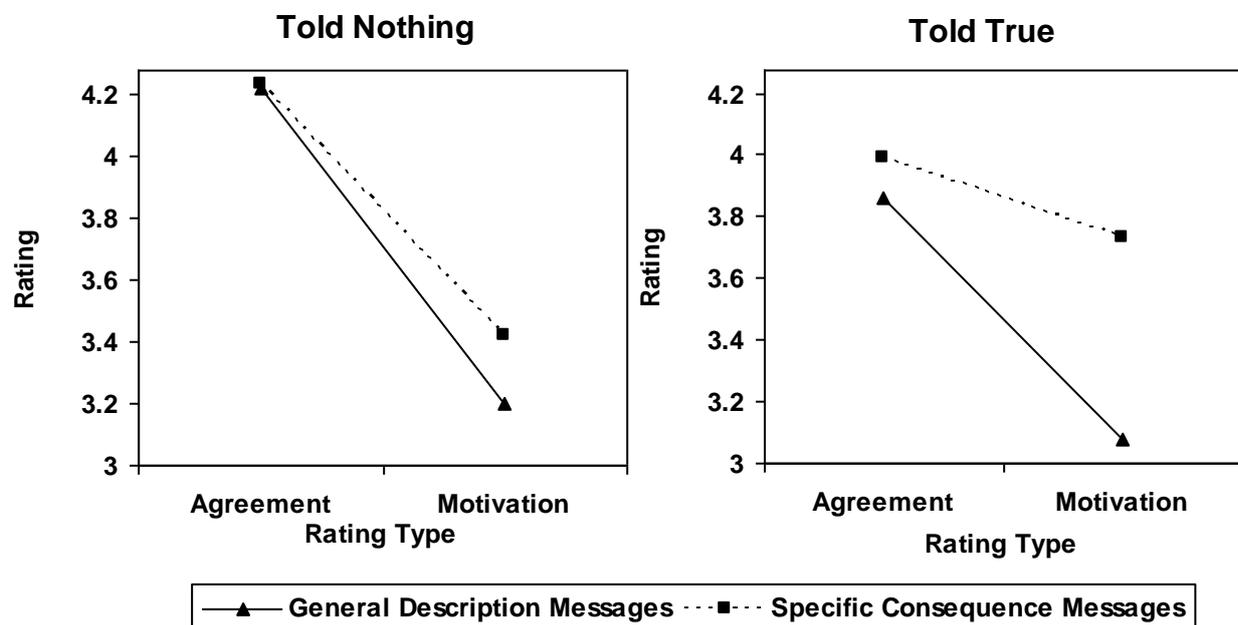
the groups it should be noted that this *must* reflect sampling variability; the difference between what the groups were told only occurred *after* the agreement ratings were taken.

Figure 3.2: Agreement and motivation ratings for the validation versus comparison groups (collapsed across all respondents)



Finally, in schedule B a significant three-way interaction between Rating Type, Message Type and Group was detected [sample 1: $F(1, 287) = 4.38, p < .05$; sample 2: $F(1, 298) = 8.38, p < .01$]. Figure 3.3 illustrates the interaction. Consistent with the earlier findings, participants in both the validation and comparison conditions provided higher motivation ratings for specific consequences than general description messages. As is evident from the figure, however, the difference in motivation ratings between specific consequences and general descriptions was greater in the validation group than in the comparison group.

Figure 3.3: Agreement and motivation ratings for interview schedule B, stratified by Group



Discussion

To date there have been few attempts to investigate how the specificity of the information contained in a message influences its persuasiveness. The existing research in this area is routed in the world of business rather than health promotion.³⁴ Using the most extensively researched model for the prediction of health behaviours, the Theory of Planned Behaviour, we hypothesised that messages which focus on specific consequences would be perceived as more persuasive than those offering more general descriptions. The current results support our hypothesis; participants in both interview schedules rated specific consequence messages as more likely to encourage stair use than general description messages. These findings happily concur with Aarts *et al.*'s recommendation that intervention programmes should explicitly state the health outcomes of exercise behaviours.⁴¹ It would appear, therefore, that specific consequence messages should be utilised in prospective campaigns. Regular stair

climbing has been associated with several key health benefits, including improved lipoprotein profiles, enhanced cardio-respiratory fitness and reduced risk of osteoporosis.^{22,23} These dividends could be used to form an array of potential messages for future use.

Meanwhile, participants who were told that the messages were true felt more encouraged to climb stairs than the comparison group. Whilst it may appear elementary that validating a message will enhance its persuasiveness, this finding has important implications. On initial exposure it seems that respondents were not fully motivated by the stair climbing messages. After receiving validation of the messages, however, individuals' motivation increased. This suggests that the previous interventions which featured these messages may have had sub-optimal effects because people lacked faith in the information presented. Hence, by finding ways to affirm the validity of messages it may be possible to heighten the impact of stair climbing interventions.

Given the extensive research documenting a relationship between source credibility and persuasiveness, one obvious means of validating messages would be to provide a credible source for the information presented.^{29,32,40} The current study did not formally test or manipulate source credibility. However, a previous intervention to promote stair climbing in the workplace found that an initial surge in stair use following installation of poster prompts was further amplified when an e-mail was circulated from the company doctor affirming the information in the posters.⁴² In public-access settings it would be easy to convey the source of a stair climbing campaign. Printed materials could incorporate the insignia of a recognised health or research body as is *de rigueur* in existing mass-media campaigns for smoking cessation, healthy eating etc. Importantly, the Elaboration Likelihood Model posits that the effects of source credibility are variable under different circumstances.^{29,39} Source credentials

have most influence in situations where the audience is unwilling or unable to think about the issue in depth.^{29,32,39} Conveying the message source may, therefore, be particularly advantageous in public-access stair climbing interventions, given that they must compete with advertising, signage and announcements for individuals' attention.

It is evident that there are separate effects of message specificity and validating messages. The 3-way interaction in schedule B suggests that these factors can also have a *composite* effect on motivation. Amongst people who were told that the messages were true, the disparity in motivation ratings between specific consequences and general descriptions was wider than in the comparison group. In effect, validating the messages further accentuated the superior ability of specific consequences to motivate stair choice. There is a logical rationale for this effect. Whereas the general descriptions are more obvious and, to an extent, incontrovertibly true, the specific consequences present bolder, more contentious scientific claims. Verification of the message content may, therefore, have had a more critical influence on motivation in the case of specific consequences. The three-way interaction supports the two main findings and confirms the substantive impact that message characteristics can exert.

Finally, participants' motivation ratings were, in general, lower than their agreement ratings. Thus, it appears that whilst some individuals may believe stair climbing messages, they are less motivated by them into action. This finding is consistent with existing evidence from social cognition models such as the TPB, which shows that awareness about health behaviours is not automatically followed by action.⁴³ The current results should, therefore, counsel health promoters against the assumption that exposure to seemingly potent stair climbing messages will necessarily yield an analogous increase in stair use. Further research into message characteristics is needed in order to narrow the discrepancy between their

capacity to simply provide information and their success in effecting *tangible* behavioural change.

It is important to acknowledge the limitations of the current study. Although the distinction between general descriptions and specific consequences was made *a priori*, one could argue that there was some overlap between categories. In particular, '*helps to keep you active*' could be considered similar to a consequence. Despite this caveat, we feel that the specific messages detail consequences of *exercise*, whereas 'keeping active' can be more accurately described as a state of being. Additionally, as with all interview-based research it is possible that responses were influenced by social desirability.^{43,44} Thus, respondents may have purposefully provided answers which they thought were congruent with the investigators research aims. This possible source of inaccuracy reflects the fact that this study was a pencil and paper exercise, unlike previous stair climbing interventions which directly observed behaviour. Therefore, caution is appropriate. Observational studies are needed to confirm these effects of self-report, before they are advocated as prerequisites of intervention design. In addition, we would have liked to have found the optimal message. Unfortunately, there were no interactions specific to individual messages which were robust across samples. Thus, future research may wish to employ a different experimental design in order to identify the single message which best motivates stair climbing. Given existing knowledge of message tailoring and social marketing theory, however, it is important to acknowledge that this optimal message may differ depending on the context in which it is presented.^{30,31,45} For example, in a school setting "*exercises your heart*" may not be effective because young people are less concerned about heart health, whereas the same message may resonate strongly with people at say a senior citizens centre.

There are, however, strengths to the experimental design. The sample size was large and the replication element increases the reliability of the findings. As Winer pointed out, the evidence provided by a single test is “*seldom complete enough to arrive at a decision which is free of all error*” [p.13].⁴⁶ An approach based on replication is less influenced by the vagaries of sampling error and is, therefore, less likely to misconstrue random artefacts as genuine effects. In addition, whereas the previous study addressing message specificity recruited university undergraduates as participants, this was a field exercise.³⁴ Whilst field research is more difficult to perform and makes it harder to demonstrate causal relationships, the ecological validity of the data is usually strong. Thus, there have recently been calls for more field research in social psychology and health-related fields in particular.³³

Previous interventions to promote stair climbing have rarely analysed the content of the messages used. This is indicative of a wider problem in mass-media health communication where insufficient consideration may be given to the content of campaigns.²⁶ This paper, therefore, makes a new contribution to the knowledge base of how to promote lifestyle physical activity. Our findings suggest that by prioritising specific consequence messages and finding ways to affirm the information presented, it may be possible to enhance the efficacy of stair climbing interventions. This study begins to refine our understanding of message dynamics and suggests that previous messages may not have unlocked the full potential of stair climbing as a model for increasing population activity levels.

References

1. Booth, F.W., Gordon, S.E., Carlson, C.J. and Hamilton, M.T. Waging war on modern chronic diseases: primary prevention through exercise biology. *Journal of Applied Physiology* 2000; **88**: 774-787.
2. US Department of Health and Human Services *Physical Activity and Health: A Report of the Surgeon General*. Atlanta, Georgia: USDHHS, Centers for Disease Control and Prevention, 1996.
3. Office for National Statistics *Health Survey for England 1998*. London: The Stationary Office, 2002.
4. National Centre for Health Statistics *Healthy People 2000 Final Review*. Hyattsville, Maryland: Public Health Service, 2001.
5. Dunn, A.L., Andersen, R.E., and Jakicic, J.M. Lifestyle physical activity interventions: History, short- and long-term effects, and recommendations. *American Journal of Preventive Medicine* 1998; **15**: 398-412.
6. Owen, N., Humpel, N., Leslie, E., Bauman, A., and Sallis, J.F. Understanding environmental influences on walking: Review and research agenda. *American Journal of Preventive Medicine* 2004; **27**: 67-76.
7. Sallis, J.F. and Owen, N. (1996) Ecological models. In Glanz, K., Lewis, F.M. and Rimer, B.K. (eds), *Health Behavior and Health Education: Theory, Research and Practice*. 2nd Ed. San Francisco, Jossey-Bass, p.403-424.
8. Stokols, D. Translating social ecological theory into guidelines for community health promotion. *American Journal of Health Promotion* 1996; **10**: 282-298.

9. Zimring, C., Joseph, A., Nicoll, G.L. and Tsepas, S. Influences of building design and site design on physical activity: Research and intervention opportunities. *American Journal of Preventive Medicine* 2005; **28**: 186-193.
10. Sallis, J.F., Bauman, A. and Pratt, M. Environmental and policy interventions to promote physical activity. *American Journal of Preventive Medicine* 1998; **15**: 379-397.
11. Andersen, R.E., Franckowiak, S.C., Snyder, J., Bartlett, S.J. and Fontaine, K.R. Can inexpensive signs encourage the use of stairs? Results from a community intervention. *Annals of Internal Medicine* 1998; **129**: 363-369.
12. Blamey, A., Mutrie, N. and Aitchison, T. Health promotion by encouraged use of stairs. *British Medical Journal* 1995; **311**: 289-290.
13. Brownell, K.D., Stunkard, A.J. and Albaum, J.M. Evaluation and modification of exercise patterns in the natural environment. *American Journal of Psychiatry* 1980; **137**: 1540-1545.
14. Kerr, J., Eves, F.F. and Carroll, D. Posters can prompt less active people to use the stairs. *Journal of Epidemiology and Community Health* 2000; **54**: 942-943.
15. Kerr, J., Eves, F.F. and Carroll, D. The influence of poster prompts on stair use: the effects of setting, poster size and content. *British Journal of Health Psychology* 2001; **6**: 397-405.
16. Kerr, J., Eves, F.F. and Carroll, D. Getting more people on the stairs: the impact of a new message format. *Journal of Health Psychology* 2001; **6**: 495-500.
17. Kerr, J., Eves, F.F. and Carroll, D. Six-month observational study of prompted stair climbing. *Preventive Medicine* 2001; **33**: 422-427.

18. Kerr, J., Eves, F.F. and Carroll, D. Encouraging stair use: stair-riser banners are better than posters. *American Journal of Public Health* 2001; **91**: 1192-1193.
19. Webb, O.J. and Eves, F.F. Promoting stair use: single versus multiple stair-riser messages. *American Journal of Public Health* 2005; **95**: 1543-1544.
20. StairWELL to Better Health. Accessed 13th October, 2004
<http://www.cdc.gov/nccdphp/dnpa/stairwell/index.htm>
21. Teh, K.C. and Aziz, A.B. Heart rate, oxygen uptake, and energy cost of ascending and descending the stairs. *Medicine and Science in Sport and Exercise* 2002; **34**: 695-699.
22. Boreham, C.A.G., Kennedy, R.A., Murphy, M.H., Tully, M., Wallace, W.F.M. and Young, I. Training effects of short bouts of stair climbing on cardiorespiratory fitness, blood lipids, and homocysteine in sedentary young women. *British Journal of Sports Medicine* 2005; **39**: 590-593.
23. Coupland, C.A., Cliffe, S. J., Bassey, E. J., Grainge, M.J., Hosking, D.J. and Chilvers, C.E.D. Habitual physical activity and bone mineral density in postmenopausal women in England. *International Journal of Epidemiology* 1999; **28**: 241-246.
24. Bess, M.H., Owen, O., Forsyth, L., Cavill, N.A. and Fridinger, F. Physical activity interventions using mass media, print media, and information technology. *American Journal of Preventive Medicine* 1998; **15**: 362-378.
25. Seale, C. (2004) Health and media: an overview. In Seale C. (ed), *Health and the Media*. Malden, Massachusetts, Blackwell Publishing Ltd., p.1-19.
26. Finlay, S-J. and Faulkener, G. Physical activity promotion through mass media: Inception, production transmission and consumption. *Preventive Medicine* 2004; **40**: 121-130.

27. Huhmann, B.A., Motherbaugh, D.L. and Franke, G.R. Rhetorical figures in headings and their effect on text processing: The moderating role of information relevance and text length. *IEEE Transactions on Professional Communication* 2002; **45**: 157-169.
28. Pentony, J.F. Effects of response involvement, quality of arguments, and number of arguments on attitude change. *Psychological Reports* 1989; **65**: 547-555.
29. Petty, R.E and Cacioppo, J.T. (1986) The elaboration likelihood model of persuasion. In Berkowitz (ed), *Advances in Experimental Social Psychology*. London, Academic Press Inc., p. 123-205.
30. Bull, F.C., Kreuter, M.W. and Scharff, D.P. Effects of tailored, personalized and general activity health messages on physical activity. *Patient Education and Counselling* 1999; **36**: 181-192.
31. Salovey, P. (2005) Promoting prevention and detection: psychologically tailoring and framing messages about health. In Bibace, R., Laird, J.D., Noller, K.L. and Valsiner, J. (Eds), *Science and Medicine in Dialogue: Thinking Through Particulars and Universals*. Westport, Connecticut, Praeger Publishers/Greenwood Publishing Group Inc., p.17-42.
32. Jones, L.W., Sinclair, R.C. and Courneya, K.S. The effects of source credibility and message framing on exercise intentions, behaviors, and attitudes: An integration of the Elaboration Likelihood Model and Prospect Theory. *Journal of Applied Social Psychology* 2003; **33**: 179-196.
33. Salovey, P and Williams-Piehota, P. Field experiments in social psychology: Message framing and the promotion of health protective behaviors. *American Behavioral Scientist* 2004; **47**: 488-505.
34. Roberson, Q.M., Collins, C.J. and Oreg, S. The effects of recruitment message specificity on applicant attraction to organizations. *Journal of Business and Psychology* 2005; **19**: 319-339.

35. Ajzen, I. The theory of planned behavior. *Organizational Behavior and Human Decision Processes* 1991; **50**: 179-211.
36. Downs, D.S. and Hausenblas, H.A. The Theories of Reasoned Action and Planned Behavior applied to exercise: A meta-analytic update. *Journal of Physical Activity and Health* 2005; **2**: 76-97.
37. Hagger, M.S., Chatzisarantis, N.L.D. and Biddle, S.J.H. A meta-analysis review of the Theories of Reasoned Action and Planned Behavior in physical activity: Predictive validity and the contribution of additional variables. *Journal of Sport and Exercise Psychology* 2002; **24**: 3-23.
38. Rothman, A.J. and Salovey, P. Shaping perceptions to motivate healthy behavior: The role of message framing. *Psychological Bulletin* 1997; **121**: 3-19.
39. Petty, R.E., Haugtvedt, C.P. and Smith, S.M. (1995) Elaboration as a determinant of attitude strength: Creating attitudes that are persistent, resistant, and predictive of behavior. In Petty, R.E. and Krosnick, J.A. (Eds), *Attitude Strength: Antecedents and Consequences*. Mahwah, New Jersey, Lawrence Erlbaum Associates Inc., p.93-130.
40. Pornpitakpan, C. The persuasiveness of source credibility: A critical review of five decades' evidence. *Journal of Applied Social Psychology* 2004; **34**: 243-281.
41. Aarts, H., Paulussen, T. and Schaalma, H. Physical exercise habit: on the conceptualization and formation of habitual health behaviours. *Health Education Research* 1997; **12**, 363-374.
42. Auweele, Y.V., Boen, F., Schapendonk, W. and Dorenz, K. Promoting stair use among female employees: the effects of a health sign followed by an e-mail. *Journal of Sport & Exercise Psychology* 2005; **27**, 188-196.

43. Webb, T.L. and Sheeran, P. Does changing behavioural intentions engender behaviour change? A meta-analysis of the experimental evidence. *Psychological Bulletin*. (in press).
44. Armitage C.J. and Conner, M. Predictive validity of the Theory of Planned Behaviour: The role of questionnaire format and social desirability. *Journal of Community & Applied Social Psychology* 1999; **9**, 261-272.
45. Andersen, A.R. *Marketing social change: Changing behaviour to promote health, social development, and the environment*. San Francisco, Jossey-Bass, 1995.
46. Winer, B.J. *Statistical principles in experimental design* . New York, McGraw-Hill, 1962.