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Review

Worksite interventions to increase stair climbing; reasons for caution

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Abstract

Point-of-choice prompts to use the stairs rather than the escalator consistently increase physical activity at public access staircases such as those in shopping malls. More recently, exercise promoters have targeted stair climbing in the worksite. A review of interventions in worksites reveals little hard evidence of successful increases in stair climbing, though the increases in stair usage are encouraging. The contrast between the worksites and public access staircases, however, is not simply one of location. In a worksite, the choice is between the stairs and an elevator rather than an escalator. We reason that the availability of the elevator or the stairwell may be the major immediate determinant of stair climbing in worksites and dilute any possible effects of an intervention.

Keywords: Stair climbing; Point-of-choice prompts; Worksites; Physical activity

Contents

Introduction

The current emphasis in physical activity promotion is on the accumulation of lifestyle activity (British Heart Foundation, 1998; Department of Health (U.K.), 2004; U.S. Department of Health and Human Services, 1996). Recently, interventions to increase stair climbing at the expense of use of the escalator have proved popular (Kerr et al., 2001d). Stair climbing is a physiologically vigorous physical activity. In the laboratory, it requires 8.6 times more energy expenditure than the resting state (Bassett et al., 1997) with a higher rate in the field (9.6 METs; Teh and Aziz, 2002). As a result of this high intensity nature, significant cardiovascular and lipoprotein effects have been obtained with a small sample of sedentary women (n = 12) climbing an average total of only 664 m of stairs over a 6-week period (Boreham et al., 2000). Typically, interventions to increase stair climbing place a sign or poster at the point-of-choice between stairs and escalators. The sign encourages travellers to use the stairs for the benefit of their health. These interventions work consistently in train and bus stations, airports and shopping centers or malls, with some evidence of success in a bank. So far, all published studies that have attempted to increase use of stairs relative to an escalator have been successful (Andersen et al., 1998, 2000; Blamey et al., 1995; Brownell et al., 1980; Coleman and Gonzalez, 2001; Kerr et al., 2000, 2001a, b,c,d; Russell and Hutchinson, 2000; Webb and Eves, 2005). Thus, for the choice of stairs over the escalator, 18 separate studies in these 12 papers report positive effects.

A more recent emphasis for health promoters is the use of point-of-choice prompts to encourage stair climbing at work (Department of Health, 2004; StairWELL to Better Health,

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2004). For example, the Chief Medical Officer for the U.K., Professor Sir Liam Donaldson, suggests that 'Employers provide opportunity for activity breaks for their staff, and for exercise and sports, and *encourage use of the stairs*' (page vi, Department of Health, 2004). In the worksite, however, the choice is between stairs and a lift or elevator. We note here reasons for a more cautious approach in worksite campaigns. In the summary below, the number of stories and hence flights of stairs in the building has been explicitly noted as research in the U.K. has suggested that employees are willing to climb an average of under four flights of stairs (Kerr et al., 2001e). Before outlining the evidence, one point should be made explicit. At 8.6–9.6 METS, Stair climbing uses three times the energy expenditure of stair descent (Bassett et al., 1997; Teh and Aziz, 2002), i.e. between 2.9 and 3.2 METS; the latter is an energy expenditure equivalent to slow walking (Ainsworth et al., 1993). To put this in perspective, individuals are being encouraged to accumulate a minimum of 30 min of brisk walking (4 METS) on five or more days of the week (British Heart Foundation, 1998; Department of Health, 2004; U.S. Department of Health and Human Services, 1996). This equates to 40 min of stair descent daily, an implausible goal. Hence it is important to distinguish stair climbing from stair descent.

Point-of-choice interventions in the worksite

A number of studies have reported data relevant to the possible success of worksite interventions. Six papers report studies that have directly tested point-of-choice interventions alone in the worksite. Coleman and Gonzalez (2001) tested a point-of-choice prompt that emphasized the benefits to the family of stair use in a three-story office building. This study reported a decrease in stair climbing by men and no change in women's stair climbing during the intervention. Marshall et al. (2002) tested point-of-choice signs at the lift in a hospital with additional footprints on the floor leading to the stairs. A transitory increase in stair climbing during the intervention in this six-story building was not sustained when the intervention was removed and failed to reappear when it was reintroduced. Indeed, a decrease in stair climbing relative to baseline was noted in the final follow up period. The next three studies tested only stair usage. van den Auweele et al. (2005) used a point-of-choice prompt in a four-story office building restricted to female employees, with a follow-up e-mail a week later from the worksite doctor extolling the benefits of stair use. Both the prompt and the e-mail increased stair use, though stair use returned to baseline at the 3-week follow-up. As observers only coded individuals entering the stairwell, however, this study could not distinguish between stair climbing and stair descent. Boutelle et al. (2001) tested the effects of signs alone and the addition of artwork and music in an eight-story building. Signs alone had no effect on stair usage. Rather it was only the addition of artwork and music that increased stair usage. Following preliminary analyses suggesting no significant interactions involving direction of stair usage, Boutelle et al. (2001) did not separate the data for stair climbing and descent, though stair descent (14.9%) was clearly more common than ascent (11.6%). In a similar study, Kerr et al. (2004) have recently reported a positive effect of signs alone in a five-story building. In addition, there was an effect of music during the second period of its use as an intervention but not the first. These authors, however, were obliged to combine both stair climbing and descent as they used photo-electric cells to monitor usage. In contrast to these studies, when a distinction between stair ascent and descent is made, there are two studies which show that signs can encourage stair descent but not stair climbing (Kerr et al., 2001e). The first of these studies used a nine-story building whereas a four-story building was employed for the second study as questionnaire data had suggested individuals on lower floors were more likely to report using the stairs. Given these effects on descent but not ascent, one cannot assume that the successful prompt interventions of stair use (van den Auweele et al., 2005; Kerr et al., 2004) demonstrate an increase in stair climbing; without an explicit distinction between stair climbing and descent, the data are uninterpretable. Critically, two studies from the US were conducted in a public health building (Boutelle et al., 2001) and the Centres for Disease Control (Kerr et al., 2004) whereas one study in Australia was conducted in a hospital (Marshall et al., 2002). If one cannot derive convincing evidence of prompted stair climbing from public health employees, it would be unwise to assume that members of the general public will inevitably climb the stairs in response to a stair climbing campaign. On balance, the negative results with non-medical work forces (Coleman and Gonzalez, 2001; Kerr et al., 2001e) may more accurately reflect the current state of knowledge about stair climbing. Despite this conclusion, it would be misleading to conclude that point-of-choice prompts for stair climbing have no future in worksites. Most of the reviewed studies provide some encouragement in that increases in stair use can be obtained, particularly with additional inducements such as improved aesthetics, music (Boutelle et al., 2001; Kerr et al., 2004) or encouragement from an e-mail (van den Auweele et al., 2005). As outlined earlier, however, stair climbing is the preferred target of these campaigns.

Other interventions to encourage choice of stairs

Four further papers provide relevant evidence when comparing stair use with choice of the elevator. Russell et al. (1999) successfully increased stair climbing in a four-story library by placing a sign that said '*Elevator for physically challenged and staff use only, others use stairs please*' (p. 258). Clearly, this sign differs from a point-of-choice prompt that emphasizes health. In contrast, Coleman and Gonzalez (2001) reported two tests of more conventional point-of-choice signs that emphasized health benefits in a six-story library. Both studies by Coleman and Gonzalez report decreased usage in men as a result of the interventions, with these decreases maintained at follow-up. In one study, females increased stair climbing but in the other study there was no change. Two further studies have employed multi-facetted campaigns that depart from simple point-of-choice prompts. In an innovative campaign, Knadler and Rogers (1987) encouraged stair climbing in a worksite for employees who occupied 14 floors of a 50-story building. The campaign was based on a competition amongst employees to climb a