A simple health sign increases stair use in a shopping mall and two train stations in Flanders, Belgium

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SUMMARY

The aim of this study was to test the impact of a simple health-promotion sign on stair use in three community settings in Flanders, Belgium. A health sign was placed at the junction between the stairs and an escalator in a shopping mall and two train stations. Observations took place on four days: baseline, first intervention, post-intervention and second intervention. In the second station, a second post-intervention phase was added. In total, 1437 choices of shoppers were registered in the mall, while 2869 and 2025 choices of commuters were recorded in the two stations, respectively. Despite the different baselines of stair use, the introduction of the health sign in the first intervention phase resulted in a significant increase in all three settings: 10.0% increase in the mall, 8.6% in the first station and 18.0% in the second station. In the second station, the increase during the second intervention exceeded that of the first intervention. Moreover, in this station stair use in the second post-intervention phase was significantly higher than at baseline. An inexpensive health-promoting sign has a substantial effect on the proportion of stair users among shoppers and commuters. Preliminary evidence was found that repeated exposure to a health sign might have a longer-term effect on stair use.

Key words: physical activity; intervention; lifestyle modifications

The impact of a simple health-promotion sign on stair use was tested in three community settings in Flanders, Belgium. A large and conspicuous sign was placed at the junction between the stairs and an escalator in a shopping mall and two train stations. This sign featured a drawing of a human figure walking up the stairs, with next to it the words ‘Stay in form, take the stairs’. Observations took place on four days: baseline, first intervention, post-intervention, and second intervention. In the second station, a second post-intervention phase was added. In total, 1437 choices of shoppers were registered in the mall, while 2869 and 2025 choices of commuters were recorded in the two stations respectively. Despite the different baselines of stair use, the introduction of the health sign in the first intervention phase resulted in a significant increase in all three settings: 10.0% increase in the mall, 8.6% in the first station, and 18.0% in the second station. In the second station, the increase during the second intervention exceeded that of the first intervention. Moreover, in this station stair use in the second post-intervention phase was significantly higher than at baseline. It is concluded that an inexpensive health-promoting sign has a substantial effect on the proportion of stair users among shoppers and commuters. Moreover, preliminary evidence was found that repeated exposure to a health sign might have a longer-term effect on stair use.

Several studies have evaluated the effectiveness of interventions to promote stair use.
These interventions usually consisted of placing a sign or poster with a health or weight-control message at the point-of-choice between the stairs and the elevator or escalator. The theory behind the placing of such health signs is that these signs operate as ‘cues to action’. ‘Cues to action’ are physical or environmental events that motivate and remind people to take action. They are considered as key determinants of healthy behaviour by the health belief model (Rosenstock, 1990). The impact that environmental changes can have on behaviour is also recognized by ecological and socio-ecological models of behaviour (Stokols et al., 1996). These models claim that behaviour is influenced by four types of determinants, operating at different levels: intrapersonal factors, interpersonal factors, cultural factors and physical environments. With regard to physical environments, it is postulated that environments restrict the range of behaviour by promoting certain actions and by discouraging others (Sallis et al., 1998). In this context, the placing of a health sign can be seen as an environmental change that promotes stair use and discourages the use of elevators or escalators.

In previous studies, it has been shown that the placing of such health signs significantly increased stair use in different settings: in worksites (Titze et al., 2001; Kerr et al., 2004; Houweling et al., 2005; Vanden Auweele et al., 2005; Eves and Webb, 2006; Eves et al., 2006; Kwak et al., 2007), in community settings, such as bus/train stations, shopping malls and airports (Brownell et al., 1980; Blamey et al., 1995; Andersen et al., 1998; Russell and Hutchinson, 2000; Coleman and Gonzalez, 2001; Kerr et al., 2001a; Nomura et al., 2006; Dolan et al., 2006; Iversen et al., 2007) and in mixed worksite/community settings, such as university buildings and health-care facilities (Boutelle et al., 2001; Marshall et al., 2002).

Despite these promising results, Eves and Masters (Eves and Masters, 2006) warned that a universal application of health signs to promote stair use is not yet in order. These authors reported an intervention in a Chinese-speaking sample in a community setting in Hong Kong without a significant increase in stair use. They concluded that the contexts in which the stair-use behaviour occurs (e.g. climate, cultural norms) may act as a barrier for behavioural change. At present, Iversen et al. (Iversen et al., 2007) are the only ones who studied the effect of a health sign in a non-English speaking European community setting. They investigated the effect of a health-promoting sign on stair use in two train stations in Copenhagen and found a significant increase from 12 to 16% in Copenhagen Central Station, and from 23 to 31% in Østerport Train Station. However, no studies in non-English-speaking European shopping malls have been conducted so far.

Therefore, our first aim was to investigate the effectiveness of a health sign in a shopping mall in Flanders (i.e. the Dutch-speaking part of Belgium). Like train stations, shopping malls are open for the general public, but they have some specific characteristics. In a train station, similar to worksites, commuters often pass the same spots at the same time every day and they are often pressed to go home or to work, especially during rush hours. By contrast, most shoppers do not visit the same shopping mall every day and are probably more relaxed and less likely to be physically active than commuters. These differences are likely to result in lower baseline levels of stair use in a shopping mall compared with train stations. Nevertheless, based on previous research in shopping malls in Anglo-Saxon culture, we hypothesized that the introduction of a health sign would significantly increase the proportion of stair users in a shopping mall in Flanders (Hypothesis 1). Because previous studies found that the visibility and size of the sign could influence the intervention effect (Kerr et al., 2001b; Webb and Eves, 2005), a rather large sign was created, measuring 33.5 in. × 24 in. (A1 format), in a highly visible orange.

A second aim was to test the effects of a reintroduction of a health sign. Previous studies on stair use usually consisted of three phases: a baseline phase, during which the percentage of stair use before the presence of the health sign was assessed; an intervention phase, during which the percentage of stair use in the presence of the health sign was observed; and a post-intervention phase, during which the percentage of stair use after the removal of the health sign was determined [e.g. (Iversen et al., 2007; Kwak et al., 2007)]. We decided to include an additional second intervention phase after the post-intervention phase. This second intervention phase allowed us to test whether the reintroduction of a health sign would have a similar or even stronger effect than the first intervention. According to the advertising literature, advertisements to which people are
exposed for a limited time (for example, ads broadcasted on television or radio) require two or three exposures to provide sufficient time for processing (Percy and Rossiter, 1997). Moreover, repeated exposure to an ad initially leads to more favourable attitudes towards the message and the product (Cacioppo and Petty, 1989; Haugtvedt et al., 1994). Based on this repetition effect in advertising, we expected that when the health sign was reintroduced in the second intervention phase (i.e. second exposure), the proportion of stair use in the mall would be higher than at baseline (Hypothesis 2a), and would possibly also exceed the stair use of the first intervention phase (Hypothesis 2b). This prediction is based on the assumption that a number of shoppers visit the shop every Saturday. Consequently, their second exposure to the health sign would prompt these returning shoppers more strongly to perform the healthy behaviour, and thus increase the general percentage of shoppers taking the stairs.

STUDY 1

Method

Health sign

The health sign we used in this study was a rather large sign, measuring 33.5 in. x 24 in. (A1 format), in a highly visible orange. The sign featured a drawing of a human figure walking up the stairs, with the words ‘Stay in form, take the stairs’ (in Dutch: ‘Blijf in vorm, neem de trap’) next to it.

Setting

Because of practical reasons (i.e. a stairwell next to an escalator and the possibility to place a sign and to observe inconspicuously), a site in front of a shop for sport clothing was selected. This site was located in a shopping mall in the city of Hasselt (i.e. the capital of the Flemish province Limburg, 70 000 inhabitants). The entrance to the shop consisted of a one-floor stairs and an adjacent escalator. The stairway consisted of 7 stairs, a landing and 17 more stairs. In the stairwell, there were several posters and dummies. The escalator protruded in comparison with the stairs, which invited to use the escalator.

People were only registered when going up to the first floor. The observer was stationed inconspicuously at a desk (first floor). As in previous studies on stair-use behaviour, individuals with large luggage, visibly pregnant women, little children, blind persons and people who were physically incapable of taking the stairs were not registered.

Design

The observations in the mall took place on four consecutive Saturdays. Each observation lasted for 2 h and 15 min (15:45–18:00). Saturday afternoons were chosen because on that day most people were present in the shopping mall. The first Saturday constituted the baseline phase, the second Saturday constituted the first intervention phase, the third Saturday constituted the post-intervention phase and the fourth Saturday constituted the second intervention phase. Table 1 gives an overview of the observations conducted in this mall.

Statistical analyses

All data were analysed with SAS 8.2 statistical software (SAS Institute Inc., Cary, NC, USA). The $\chi^2$ test was used to test for changes in proportions of people using the stairs during the different phases.

Results

A total of 1437 behavioural decisions were observed in the shopping mall. As predicted in Hypothesis 1, stair use increased significantly between baseline and first intervention from 1.7 to 11.7%, $\chi^2 (1) = 28.77, p < 0.001$. Stair use then decreased significantly between the first intervention and the post-intervention phase from 11.7 to 4.5%, $\chi^2 (1) = 13.39, p < 0.001$. Interestingly, the proportion of stair use in this post-intervention phase was still significantly higher than baseline, i.e. 4.5 vs. 1.7%, $\chi^2 (1) = 4.92, p < 0.05$. Between the post-intervention phase and the second intervention phase, when the health sign was reintroduced, stair use increased significantly from 4.5 to 16.3%, $\chi^2 (1) = 28.26, p < 0.001$. In line with Hypothesis 2a, this percentage of stair use in the second intervention phase was significantly higher than baseline (16.3 vs. 1.7%, $\chi^2 (1) = 46.20, p < 0.001$). However, contrary to Hypothesis 2b, it did not differ significantly from stair use in the first intervention phase, but there was a
tendency in the predicted direction, namely 16.3 vs. 11.7%, $\chi^2 (1) = 2.96$, $p > 0.05$.

**Discussion**

In line with our expectations, the results of the first study indicate that a health sign does influence the percentage of stair users in a shopping mall in a non-English-speaking population. Surprisingly, the percentage of stair use in the post-intervention phase was significantly higher than baseline. A possible explanation for this difference between the post-intervention phase and baseline is that a number of regular visitors of the shop on Saturdays still remembered the health sign of the previous week and continued to comply with the message. We had not expected this, considering that there was a gap of 1 week between the first intervention and the post-intervention phase. Moreover, previous studies on stair use generally revealed that stair use in the post-intervention phase falls back to the baseline level, even in worksite settings where employees had been exposed repeatedly to the health sign (Vanden Auweele et al., 2005). The present study hints at the possibility that some shoppers might experience a longer term effect of exposure to the health sign.

As we had predicted, reintroduction of the health sign resulted again in a significant increase in stair use that was significantly above the baseline level. On the other hand, stair use in this second intervention phase did not significantly exceed stair use in the first intervention phase, even though there was a tendency in this direction. One possible reason for this non-significant finding is that each of the four observation phases were separated by a week. We decided to observe on four consecutive Saturdays to maximize the potential number of observations, and because we assumed that shoppers are not likely to visit the sports shop every day. However, one disadvantage of this decision is that the time gap between the observations is quite large. Moreover, we have no idea to what extent the same shoppers are included in the observations. These consequences might have limited the impact of the reintroduction.

We therefore decided to retest our hypotheses with the same health sign as in Study 1 in a different community setting, namely a train station. As mentioned before, unlike shoppers in a mall, most commuters in a train station pass the same spots in the station every day at about the same time. Therefore, commuters are even more likely to remember exposure to a health-sign than shoppers, in particular when observations are conducted on 4 consecutive days. As in Study 1, we hypothesized that the introduction of a health sign would significantly increase the proportion of commuters taking the stairs instead of an elevator (Hypothesis 1). We also hypothesized that when the health sign is reintroduced in the second intervention phase, the proportion of stair use in the station would be higher than baseline (Hypothesis 2a), and would possibly also exceed the stair use of the first intervention phase (Hypothesis 2b).

### STUDY 2

**Method**

**Setting**

The train station of the city of Hasselt was selected. This station consisted of one floor. The main exit of the building was observed and only people going up to the first floor were registered. The observer sat on the stairs on the left of the intervention site. She pretended to be a traveller waiting for her train. Because the stairs and escalator were adjacent, it was easy to observe the choice people made. The stairway counted 12 stairs, a landing and 11 more stairs. Because the stairs were a lot wider in comparison with the escalator, people had more space
to take the stairs. The overall impression of the stairwell was rather unattractive.

As in Study 1, people were only registered when going up to the first floor. The observer pretended to be a traveller waiting for her train at the ground level. Individuals with large luggage, visibly pregnant women, little children, blind persons and people who were physically incapable of taking the stairs were not registered.

**Design**

The intervention in the station in Hasselt took place on four consecutive weekdays (Monday, Tuesday, Wednesday and Thursday). Each observation started at exactly 15:55 and ended at 18:25, i.e. 2 h and 30 min. This time period was chosen because these were the rush hours in the evening and the number of potential commuters was high. Baseline observations were performed on a Monday at the end of February 2007. The intervention sign was placed for the first time on Tuesday (i.e. first intervention phase). The next day, on Wednesday, the sign was removed (i.e. post-intervention phase). On Thursday, the sign was placed again (i.e. second intervention phase). In Table 2, an overview of these observations is shown.

**Results**

In total, 2869 behavioural decisions were observed at the train station in Hasselt. As predicted in Hypothesis 1, there was a significant increase in stair use between baseline and the first intervention day from 35.2 to 43.8%, $\chi^2 (1) = 11.58$, $p < 0.001$. Stair use in the post-intervention phase then dropped to 39.0%, but this decrease was not significant, $\chi^2 (1) = 3.36$, $p < 0.10$. This percentage of stair use in this post-intervention phase (i.e. 39.0%) was not significantly different from the baseline level (i.e. 35.2%): $\chi^2 (1) = 2.13$, $p > 0.10$. Between the first post-intervention phase and the second intervention phase, when the sign was reintroduced, stair use increased significantly from 39.0 to 47.8%, $\chi^2 (1) = 10.98$, $p < 0.001$. In line with Hypothesis 2a, stair use in this second intervention phase was significantly higher than baseline (47.8 vs. 35.2%, $\chi^2 (1) = 24.31$, $p < 0.001$). However, contrary to Hypothesis 2b, it was not significantly higher than stair use in the first intervention phase, but again there was a tendency in the predicted direction (47.8 vs. 43.8%, $\chi^2 (1) = 2.37$, $p > 0.10$).

**Discussion**

As hypothesized, the results of Study 2 indicated that a health sign increased the percentage of stair users in a train station in Flanders. It should be noted that unlike the findings of Study 1 in a shopping mall, the percentage of stair use in the post-intervention phase was not significantly higher than baseline, even though there was a non-significant tendency in this direction. This finding suggests that there is no immediate retention effect of a one-day intervention in a station. Another explanation for this non-significant finding might be the high baseline value that we started with.

As we had predicted, reintroduction of the health sign on Day 4 resulted in a significant increase in stair use that was significantly above the baseline level. However, contrary to our expectations, stair use in this second intervention phase did not significantly exceed stair use in the first intervention phase, even though there was again a tendency in the hypothesized direction. Considering that, we again found a non-significant tendency for the second intervention to exceed the baseline, and even though this baseline percentage was quite high, we decided to replicate Study 2 with the same health sign in another station. In addition, we also included an additional second post-intervention phase. In this second post-intervention phase, the percentage of stair use is observed after the removal of the reintroduced health sign. This new phase would allow us to test whether the

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**Table 2**: Overview of observations and results in the train station in Hasselt

<table>
<thead>
<tr>
<th>Day</th>
<th>Observation phase</th>
<th>Sign (yes or no)</th>
<th>Number of observations</th>
<th>Percentage of stair use</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Monday Baseline</td>
<td>No</td>
<td>728</td>
<td>35.2</td>
</tr>
<tr>
<td>2</td>
<td>Tuesday First</td>
<td>Yes</td>
<td>746</td>
<td>43.8</td>
</tr>
<tr>
<td>3</td>
<td>Wednesday First</td>
<td>No</td>
<td>644</td>
<td>39.0</td>
</tr>
<tr>
<td>4</td>
<td>Thursday Second</td>
<td>Yes</td>
<td>751</td>
<td>47.8</td>
</tr>
</tbody>
</table>
reintroduction of the health sign would lead to a delayed retention effect.

Similar to Study 1 and Study 2, we predicted that the introduction of the health sign would significantly increase the proportion of commuters taking the stairs instead of an elevator (Hypothesis 1). We predicted again that when the health sign is reintroduced in the second intervention phase, the proportion of stair use in the station would be higher than baseline (Hypothesis 2a), and would also exceed the stair use of the first intervention phase (Hypothesis 2b). Finally, we also predicted that the percentage of stair use in the additional second post-intervention phase would be higher than the percentage of stair use at baseline because of a delayed retention effect (Hypothesis 3).

**STUDY 3**

**Method**

**Setting**

The train station of the city of Harelbeke (i.e. a city in the Flemish province West-Flanders, 26 000 inhabitants) was selected. This station consisted of one floor with two tracks. The stairway counted 40 stairs with a landing after each 10 stairs. Because the stairs were about twice as wide as the escalator, people had more space to take the stairs. The overall impression of the stairwell was rather unattractive.

Only people going up to the first track were registered. The observer pretended to be a traveller waiting for her train at the ground level. Again, individuals with large luggage, visibly pregnant women, little children, blind persons and people who were physically incapable of taking the stairs were not registered.

**Design**

The intervention in the station in Harelbeke took place on 5 consecutive weekdays, starting on Monday 7 of April 2008. Each observation started at exactly 6:10 and ended at 9:10, i.e. 3 h. This time period was chosen because these were the rush hours in the morning and the number of potential commuters was high. The intervention sign was placed for the first time on Tuesday (i.e. first intervention phase). The next day, on Wednesday, the sign was removed (i.e. post-intervention phase). On Thursday, the sign was placed again (i.e. second intervention phase). Contrary to the station in Hasselt, we also monitored stair use on Friday, when the sign was removed again (i.e. second post-intervention phase). This would allow us to check whether the effect of the second intervention would be more lasting than that of the first intervention. Table 3 provides an overview of all observations in Harelbeke.

**Results**

In total, 2052 behavioural decisions were observed at the train station in Harelbeke. In line with Hypothesis 1, there was a significant increase in stair use between baseline and the first intervention phase: from 9.4 to 27.4%, $\chi^2 (1) = 43.63, p < 0.001$. Between the first intervention phase and the first post-intervention phase, stair use decreased significantly from 27.4 to 11.9%, $\chi^2 (1) = 30.64, p < 0.001$. Stair use in this first post-intervention phase did not differ significantly from baseline, 11.9 vs. 9.4%, $\chi^2 (1) = 1.39, p > 0.20$. Between the post-intervention phase and the second intervention phase, when the sign was reintroduced, stair use increased significantly from 11.9 to 33.8%, $\chi^2 (1) = 54.81, p < 0.001$. As predicted in Hypothesis 2a, stair use in this second intervention phase did not differ significantly from baseline, 11.9 vs. 9.4%, $\chi^2 (1) = 1.39, p > 0.20$. Between the post-intervention phase and the second intervention phase, when the sign was reintroduced, stair use increased significantly from 11.9 to 33.8%, $\chi^2 (1) = 54.81, p < 0.001$. As predicted in Hypothesis 2a, stair use in this second intervention phase significantly exceeded stair use in the first intervention phase, 33.8 vs. 27.4%: $\chi^2 (1) = 4.02, p < 0.05$.

**Table 3**: Overview of observations and results in the train station in Harelbeke

<table>
<thead>
<tr>
<th>Day</th>
<th>Observation phase</th>
<th>Sign (yes or no)</th>
<th>Number of observations</th>
<th>Percentage of stair use</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Monday Baseline</td>
<td>No</td>
<td>436</td>
<td>9.4</td>
</tr>
<tr>
<td>2</td>
<td>Tuesday First intervention</td>
<td>Yes</td>
<td>419</td>
<td>27.4</td>
</tr>
<tr>
<td>3</td>
<td>Wednesday First post-intervention</td>
<td>No</td>
<td>394</td>
<td>11.9</td>
</tr>
<tr>
<td>4</td>
<td>Thursday Second intervention</td>
<td>Yes</td>
<td>426</td>
<td>33.8</td>
</tr>
<tr>
<td>5</td>
<td>Friday Second post-intervention</td>
<td>No</td>
<td>377</td>
<td>15.1</td>
</tr>
</tbody>
</table>
When the sign was removed again between the second intervention phase and the second post-intervention phase, stair use decreased significantly from 33.8 to 15.1%, $\chi^2 (1) = 37.20, p < 0.001$. However, in line with Hypothesis 3, the level of stair use in this second post-intervention phase significantly exceeded the baseline level, 15.1 vs. 9.4%, $\chi^2 (1) = 6.23, p < 0.05$.

Figure 1 gives an overview of the pattern of results for the three settings.

Discussion
The results of Study 3 confirmed all of our predictions. First, introduction of the health sign in the station in Harelbeke increased stair use significantly. Second, reintroduction of this health sign resulted in an increase that not only exceeded the baseline level, but also the stair use observed during the first intervention phase. Finally, stair use during the second post-intervention phase remained at a level that was significantly higher than baseline. These findings suggest that repeated introduction of a health sign might reinforce its immediate impact, and lead to a longer term retention effect after removal.

GENERAL DISCUSSION
The abovementioned studies demonstrate that a simple and inexpensive health sign significantly increases the proportion of stair users in various community settings (i.e. a shopping mall and two train stations) in Flanders, Belgium. We point that this is the first paper showing such effect in a shopping mall in a non-English-speaking country. Furthermore, all three studies indicate that reintroduction of a health sign after removal leads to a renewed increase in stair use that exceeds the baseline level. The study in the second station even suggests that this reintroduction might result in a higher proportion of stair users compared with the first intervention phase. Moreover, this last study also hints at the possibility that such reintroduction leads to a longer term retention effect, given that the percentage of stair use in the second post-intervention phase (i.e. after the second removal of the health sign) still exceeded the baseline level.

It should be noted that the proportion of stair use at baseline differed substantially between the three settings. More specifically, the initial percentage of stair use was much higher in the station in Hasselt than in the station in Harelbeke or in the shopping mall in Hasselt (i.e. 35.2 vs. 9.4 vs. 1.7%). There are several possible explanations for the very low baseline level in the mall. First, the motivational context of commuting vs. shopping is very different. A shopper is probably less likely to take the stairs because (s)he is usually relaxed and not in a hurry. By contrast, the observations in the train stations were made during rush hours, when commuters are eager to go home and/or catch their train. As a consequence, commuters are less likely to wait in line to take the escalator. A second possible explanation is that the escalator in the mall was protrusive with regard to the stairs, which is very inviting for shoppers to take the escalator.

We point out that the percentage of stair use at baseline in our Flemish shopping mall was similarly low to that reported by Andersen and co-workers in 1998 in a shopping mall in the USA, namely 1.7 vs. 4.8%. On the other hand, the Flemish shoppers increased their stair use in response to the health sign more than the American shoppers, namely 10.7 vs. 2.1%, even though the size and the content of the health sign were rather similar in both settings. A possible reason for this different impact is that our observations took place in a sport-clothing shop. Although the customers of this sport-clothing shop were not more likely to use the stairs at baseline, they might have been more sensitive to the health message than the general
customers observed by Andersen et al. (Andersen et al., 1998).

The difference in the percentage of stair use at baseline between the two train stations can be attributed to two contextual factors. First, the train station in Hasselt was more crowded than in Harelbeke (i.e. 291 observations per hour in Hasselt vs. 145 observations per hour in Harelbeke). Consequently, the escalator in Hasselt was probably more occupied than the escalator in Harelbeke, causing commuters in Hasselt to lose more valuable time should they decide to wait before the escalator. Second, the stairs in Hasselt were a lot wider than in Harelbeke, which gave these commuters more space to use the stairs.

It should be noted that the effect of the health sign in the station in Hasselt (i.e. an initial increase in stair use of 8.6%) is comparable to the increase observed in previous studies in public transport stations, namely 7–9% in Glasgow (Blamey et al., 1995), 4% in Copenhagen and 8% in Østerport (Iversen et al., 2007). On the other hand, the impact of the health sign in the station in Harelbeke was substantially stronger (i.e. an initial increase of 18.0%). We have no real explanation for this difference, except that a combination of factors (i.e. less commuters, smaller corridor, etc.) might have enhanced the visibility of the health sign in Harelbeke compared with Hasselt.

Finally, we would like to point out that in order to have a public health impact, interventions to promote stair use should be integrated in a broader, multilevel approach. Ideally, a multilevel approach should target not only environments but also individuals, family and peers, community settings such as schools, workplaces and neighbourhoods and societal factors such as cultural norms and policies. According to the social ecological model (Stokols et al., 1996), all these factors influence health-related behaviours.

We realize that our studies had several limitations. First, all observation phases were limited to one specific day. This undermines the reliability of our findings. On the other hand, the fact that similar effects emerged in three different settings hints at the robustness of our results and conclusions. Second, observations in the train stations were carried out during rush hours only. During rush hours, commuters might be more inclined to climb the stairs than to wait in a line in front of the escalator. By contrast, during calmer hours of the day, they might be more likely to use the escalator. In other words, the specific observation slots in the train stations might have boosted the effect of the health sign. Third, because of differences in the design of the three studies, we were not able to include characteristics of the setting (e.g. number and width of stairs, function of the building) as independent variables in the analyses, which would have been relevant to directly compare the impact of such environmental background features on stair use. Fourth, we were not able to differentiate between people of different age, gender or body weight to see whether the health sign had similar effects on each type of participants. Finally, because of practical considerations, only one observer was responsible for the observations in each setting. Moreover, this observer was aware of the research hypotheses. We acknowledge that personal observation is more likely to be biased than automatic measurement (Titze et al., 2001). On the other hand, personal observation makes it possible to eliminate individuals incapable of climbing the stairs.

To conclude, despite the abovementioned limitations, the three studies presented in this paper underline the potential impact of a simple and inexpensive health sign in community settings. Moreover, preliminary evidence was provided that the reintroduction of a health sign might result in an amplified effect, lasting to some extent after removal. Future studies should therefore focus on establishing the longer term effects of health signs by observing for longer time periods, and on exploring the consequences of multiple exposures.

REFERENCES


