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Effects of a culturally sensitive sign on the use of stairs in African American commuters

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Summary

Objectives: To examine the effectiveness of a culturally sensitive sign to encourage stair use among African American commuters.

Methods: 16035 commuters were observed in their using either stairs or an adjacent escalator in a subway station. After baseline observation, a culturally sensitive sign to promote stair use was displayed beside the escalator/stairs. Demographic information and use of escalators/stairs were recorded.

Results: Stair use increased from 15.8% to 21.5% with the sign. Caucasian commuters used the stairs 23.1% of the time at baseline, and increased to 28.3% with the sign. Among African Americans, stair use increased from 10.3% to 16.4% with the sign. African American women showed the greatest increases in stair use. Stair use remained elevated the week after the sign was removed in all commuters. Among African Americans, stair use returned to baseline within three weeks. Stair use increased significantly among both overweight and non-overweight Caucasians and African Americans.

Conclusion: Culturally sensitive interventions can promote physical activity among African Americans in an urban setting.

Keywords: Physical Activity – African Americans – Culturally Sensitive Intervention – Stair Use – Activity Strategies.

The American Heart Association lists a sedentary lifestyle as one of its modifiable risk factors (Fletcher et al. 1996). Reports suggest that only 22% of the U.S. adult population are active enough to derive health benefits from their physical activity and that one in four Americans are completely sedentary (U.S. Department of Health and Human Services 1996).

African Americans are even more likely than their Caucasian counterparts to report doing no leisure time physical activity (Crespo et al. 1996), even when the effects of social class are accounted for (Crespo et al. 2000). The Surgeon General recommends that all Americans should accumulate 30 min or more of moderate-intensity physical activity on most or all days of the week (U.S. Department of Health and Human Services 1996). Inactive people who increase their levels of physical activity are less likely to die of all-causes and of cardiovascular disease than those who remain sedentary (Blair et al. 1989; Paffenbarger et al. 1986). A review of various studies suggests that there is a direct inverse linear dose-response relationship between volume of physical activity and all-cause mortality rates in adults (Lee & Skerrett 2001). Furthermore, there is substantial evidence that leisure time physical activity is associated with a reduced risk of coronary heart disease (Wannamethee & Shaper 2001). Walking up the stairs instead of escalators or elevators may be an easy way for many apparently healthy, sedentary adults to increase their levels of moderate activity (Andersen 1995; Andersen et al. 1997; Andersen et al. 1998; Blair et al. 1992; Gordon et al. 1993). In 1980, Brownell et al. (1980) examined the effects of placing a sign that prompted stair use for health benefits at the base of an escalator, which was adjacent to stairs in a Philadelphia mall, train station and bus terminal. They reported that the sign resulted in statistically significant increases in stair use among 45 694 observed commuters. They also noted that overall African Americans did not use the stairs as much as Caucasians. We have previously reported that Caucasian shoppers increased stair use by 47% in response to a cartoon sign which encouraged stair use for health benefits, whereas, African American shoppers took the stairs 17% less (Andersen et al. 1998). Though worrisome, these findings are consistent with those of several public information campaigns that have successfully altered health-related behaviors

among the general public, but in large part have been unsuccessful motivating change among minority populations (Daniels et al. 2002; O'Malley et al. 1999; Orleans et al. 1999). For example, the rate of traffic-related injuries and fatalities is disproportionately higher among African Americans. In a recent review, Daniels et al. (2002) concluded that national campaigns, with general messages only slightly modified for African Americans, have not been effective in changing traffic safety behavior, despite federal, state and local laws to enforce and promote sound traffic safety practices. The effects of generic versus culturally sensitive HIV-AIDS risk-reduction messages were also examined in African American urban women. They reported that women who viewed messages presented by African American women were more likely to be sensitized to AIDS, be tested for the HI-virus during follow up and to request condoms at follow up (Kalichman et al. 1993).

The purpose of this investigation was to: 1) develop a culturally sensitive sign to promote stair use among African American commuters; and 2) to test the short- and long-term effectiveness of the sign in promoting stair use among persons of different ages, race, gender, and body weight in a subway station where escalators and stairs were adjacent. We also wanted to observe the residual effects of the sign in the weeks after it was removed.

Methods

Pilot Study

In a previous study, we reported that African American shoppers used stairs 17% less in response to a sign that featured a caricature of a heart at the top of stairs and a phrase stating, "Your heart needs exercise ..., use the stairs" (Andersen et al. 1998). We wanted to see if this finding could be replicated in a commuter subway station using the same sign. We recorded whether commuters elected to walk two flights of stairs or ride an adjacent escalator during morning hours. The race, age and gender of each commuter was recorded from 6:30AM to 9:30AM for one week with no sign present and for one week after the previously mentioned sign was erected. This pilot study took place one subway stop past where the primary investigation was scheduled to take place.

During the baseline week, 6.9% (95% CI = 4.4–9.3%) of 407 African American commuters chose to walk the stairs instead of an adjacent escalator, while 13.5% (95% CI = 7.6–19.4%) of 133 Caucasian commuters did so. During the second week of the pilot study we erected our sign from the previous investigation and recorded stair use. During week two, 6.7% (95% CI = 3.8–9.6%) of African American commuters took

the stairs, which was not different from baseline. In contrast, stair use increased significantly among Caucasian commuters, with 23.6% (95% CI = 15.4–31.8%) walking up the stairs with the sign in place. Thus, our pilot study confirmed that a generic sign to promote stair use, resulted in a slight reduction in stair use of 2% among African American commuters, versus a 74% increase among Caucasians.

Developing a culturally sensitive sign. Ideas for a culturally sensitive sign were gathered from the community and from a stand set up in the hospital cafeteria. We also hosted several focus groups with members of the African American community to assist in the development of an appropriate sign to promote stair use among African-Americans in a commuter setting. Although many ideas were generated, occurring ideas guided investigators to a culturally tailored sign with a happy and enthusiastic African-American as the role model (picture). The feedback from the focus group was that a fit appearance of a model would enhance stair use. Furthermore, several of the African-American focus group participants stated that lack of time for exercise was the greatest barrier to becoming active, which led us to the written phrase on the sign. From the combination of these ideas, a sign was created that pictured a fit looking African American woman climbing the stairs with a caption reading "No time for exercise? Try the stairs." This sign can be seen in Figure 1.

Study Sample

A total of 16035 adult commuters in an urban subway station mall located in Baltimore Maryland were observed while taking stairs or escalators. Due to the potential for an artificial influence on the person's decision process, those carrying items larger than a briefcase were excluded. Those individuals carrying a baby or child were also excluded, as were persons judged to be under 18 years of age. Participants were unaware that they were part of a study investigating physical activity patterns, as observers were recording data unobtrusively from a landing above.

Design. This observational study involved an initial baseline phase and two subsequent intervention phases incorporating the use of a culturally appropriate motivational sign displayed at the base of the escalator/stairs. At baseline (weeks 1 and 2), the frequency of stair use versus the adjacent escalator was recorded for two weeks. During the second phase of the investigation (weeks 3 and 4), stair use was recorded when a 47 cm by 71 cm culturally appropriate sign promoting stair use was placed on an easel beside the elevator/stairs for an additional two weeks (intervention phase). To test residual effects of the sign, the sign was removed for the third phase of the study (week 5) and stair use was recorded for one week. There was no sign posted and no data collected at Week 6. Stair use was



Figure 1 Culturally sensitive sign used to promote stair use among commuters in a Baltimore Subway Station

once again recorded for one week without the sign present at Week 7. Finally, the last phase of the study involved putting the sign up once again at Week 8 and recording stair use (2nd intervention phase).

Setting. This investigation took place in a subway station of a University Hospital in Baltimore, Maryland. Once getting off the subway, commuters chose to ride either the escalator, or to walk up an adjacent two flights of stairs to access the ground level. A stairway was located adjacent to ascending and descending escalators. The stairway consisted of 16 stairs followed by a 6-foot landing and 16 more stairs. All observations were made during the months of May, June, July and August between 6:30AM and 10:00AM on weekdays.

Procedures. Observations were made by two of the authors (KZ and EC). One observer coded male commuters, while the other coded the females. Before the study began, the observers (KZ and EC) and the senior author (RA) spent a full morning in a subway station classifying commuters by age, race and weight status to ensure that observations were as consistent and accurate as possible. The observers sat in an inconspicuous spot on the upper landing on top of the steps that allowed for clear observation.

Frequency of stair use was recorded in the same way during each phase of the study. It was also noted whether commuters rode or walked up the escalator. Each person's sex and race (African American, Caucasian or other) was recorded. Their age was also judged to be either older or younger than 40 years. Finally, the observer also noted whether or not the person appeared to be overweight.

Statistical Analyses. Changes in the proportion of persons using the stairs during the baseline and intervention phases of the study were analyzed using the chi-square test. The same procedure was employed to examine inter-group differences (e.g., normal weight vs. overweight) within a given phase of the study. We also computed the "number needed to treat" (NNT: the number of commuters needed to be exposed to the sign to get one person to use the stairs) as $1/RD$, where RD is expressed as the difference in proportions between the two comparison groups. Results are presented as the proportion of persons who opted to use the stairs vs. the escalator, along with 95 % confidence intervals (95 % CI) and NNT data. All data were analyzed using SPSS for Windows (Version 10.0) statistical package (Norusis 1992).

Results

A total of 16 035 observations were made. Overall, the use of stairs at baseline was 15.8 % (95 % CI = 14.8–16.7 %). During the first intervention period when the sign was displayed, stair use increased significantly to 21.5 % (95 % CI = 20.3–22.7 %; NNT = 18) and remained elevated with 20.5 % (95 % CI = 18.6–22.2 %) walking up the stairs during the first week the sign was removed. Three weeks after the sign was removed stair use had decreased to 17.1 % (95 % CI = 15.6–18.6 %) and increased again above baseline levels to 19.1 % (95 % CI = 17.3–20.9 %) when the sign was displayed again.

Race. Of all commuters observed, 8 477 were African American, 6 689 were Caucasian and the remaining 869 were classified as "other race." When the commuters were stratified by race (i.e., Caucasian, African American, other), we found that Caucasian commuters took the stairs significantly more often than African Americans during each phase of the study. However, we found that both African American and Caucasian commuters increased their stair use when the sign was displayed. At baseline, 10.3 % (95 % CI = 9.0–11.5 %) of the African Americans walked up the stairs, while 16.4 % (95 % CI = 15.1–17.7 %; NNT = 16) did so when the sign was up. At baseline, 23.1 % (95 % CI = 21.3–25.0 %) of Caucasian commuters walked up the stairs while 28.3 % (95 % CI = 26.2–30.3 %; NNT = 20) walked the stairs when the sign was erected. Stair use remained elevated in African American commuters one week after the sign was removed, but returned

to baseline levels, three weeks after the removal, and overall stair use was not different from baseline 4 weeks after it was initially displayed. The stair use of Caucasian commuters remained above baseline levels 3 weeks after the sign was removed, whereas stair use among African American commuters had returned to baseline levels. These race-specific data are displayed in Figure 2 below.

Gender. At baseline, 16.0% (95% CI = 14.4–17.6%) of all of the male commuters took the stairs, while 15.6% (95% CI = 14.3–16.9%) of the women did so. Both men and women increased their stair use when the sign was initially in place, with 20.3% (95% CI = 18.3–22.3%; NNT = 23) of men and 22.2% (95% CI, 20.6–23.7%; NNT = 15) of women taking the stairs. Figure 3 presents the race- and gender-specific percentage of commuters using the stairs during each phase of the study. Caucasian men and women were more likely than their African American counterparts to walk up the stairs at any phase of the study. The greatest increases in stair use were seen by African American women, who increased their stair use by over 70% (NNT = 14), while Caucasian women increased their stair use by 26% (NNT = 16) in response to the sign. Male African American commuters increased their stair use from 10.5% (95% CI = 8.5–12.5%) at baseline to 14.2% (95% CI = 11.6–16.8%, NNT = 27). Caucasian males increased their stair use slightly when the sign was first displayed, although this increase was not statistically significant. Interestingly, Caucasian men were the only group whose stair climbing increased above baseline levels when the sign was displayed for a second time, four weeks after it was originally erected. The race- and gender-specific proportions of commuters walking up the stairs during each phase of the study are plotted in Figure 3 below.

Younger vs. Older Individuals. At baseline, 16.2% (95% CI = 14.9–17.4%) of all the commuters judged to be under the age of 40 took the stairs. With the display of the sign, 22.7% (95% CI = 21.3–24.2%; NNT = 14) of those judged to be under 40 years took the stairs. A similar pattern emerged among those judged to be over the age of 40. At baseline 15.8% (95% CI = 14.2–17.5%) took the stairs, while 18.9% (95% CI = 16.6–21.3%; NNT = 32) chose to climb the stairs when the sign was displayed. Younger commuters continued to use the stairs above baseline levels the week after the sign was removed and when it was displayed again four weeks after it was originally presented. In contrast, the commuters who were judged to be over 40 years returned to their baseline levels when the sign was removed.

The race- and age-specific proportions of commuters who walked up the stairs at each phase of the study are displayed in Table 1. African American commuters judged to be over the age of 40 years took the stairs significantly less than their

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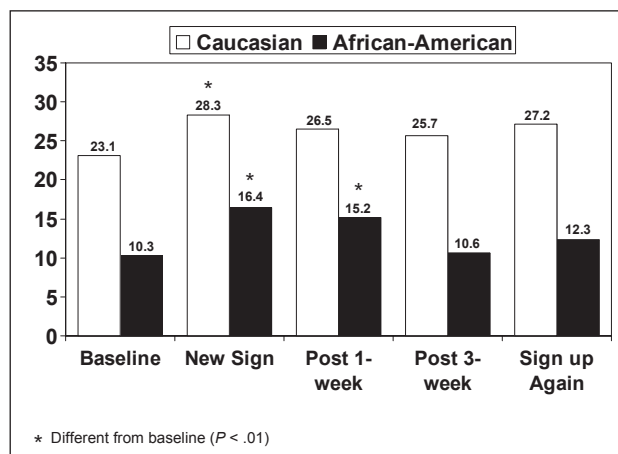


Figure 2 Patterns of stair use among Caucasian and African-American commuters during study. Open bars represent Caucasian commuters and shaded bars represent African-American commuters. Values are sample percentages

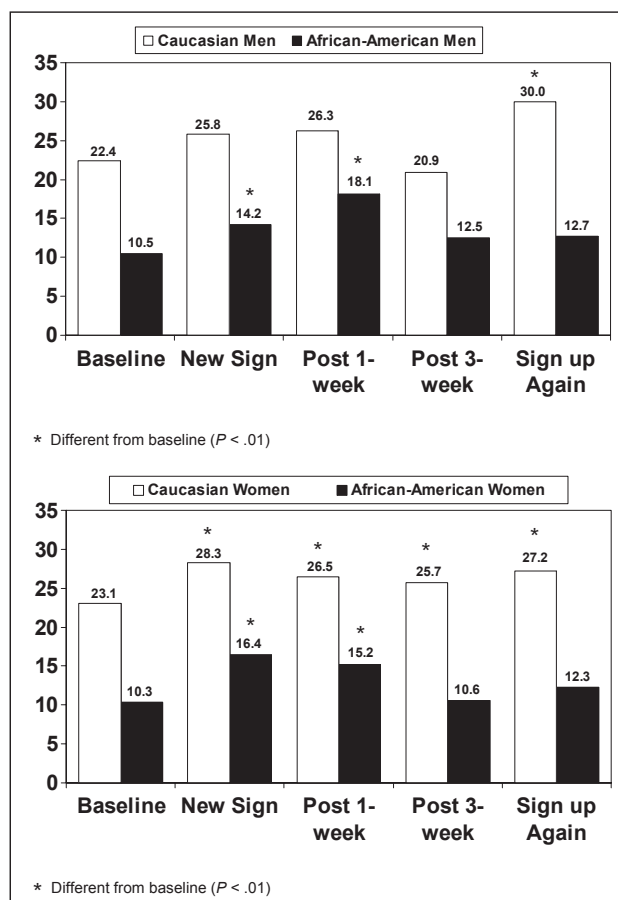


Figure 3 Gender- and Race-specific patterns of stair use among commuters during the study. Open bars represent Caucasian commuters and shaded bars represent African-American commuters, men are plotted in the top panel and women are displayed on the bottom. Values are sample percentages

younger African American counterparts. Furthermore, both older and younger African Americans increased their stair use when the sign was in place. However, both age groups of African American commuters took the stairs less than the younger or older Caucasians at any point of the study.

Weight Status. Commuters were stratified by weight status (i.e., judged to be not-overweight vs. overweight). Among those judged to be not-overweight, baseline stair use was 18.7% (95% CI = 17.5–19.9%), and this increased to 24.4% (95% CI = 22.9–25.8%; NNT = 18) when the sign was displayed. Among those judged to be overweight, 4.3% (95% CI = 3.1–5.4%) used the stairs at baseline and 9.4% (95% CI = 7.4–11.4%; NNT = 19) did so when the sign was displayed. All commuters, regardless of weight status continued to use the stairs above baseline levels the week after the sign was removed. However, both overweight and non-overweight commuters lapsed back to baseline patterns of stair use three weeks after the sign was removed.

The race- and weight-specific proportion of commuters who walked up the stairs at each phase of the study is displayed in Table 1. Only 3.9% of African American commuters judged to be overweight took the stairs at baseline and this proportion more than doubled to 8.2% (NNT = 23) when the sign was displayed. No differences were seen in stair use between Caucasian and African American overweight commuters at baseline. However, overweight Caucasian commuters were more likely to walk up the stairs both when the sign was initially displayed and in the week immediately after it was originally in place. Among those classified as being not overweight, Caucasians took the stairs significantly more often than African Americans at each measurement period in the study.

Discussion

The principal finding of this study was that a culturally sensitive sign can successfully promote stair use among African American commuters in an urban environment. This finding is important, given that African American adults are more likely to report being sedentary in their leisure time (Crespo et al. 1999; Crespo et al. 2000). Kerr et al. (2000) also recently reported that posters designed to promote stair use significantly increased stair use among less active shoppers in Great Britain.

In this study, stair use remained elevated above baseline levels in both Caucasian and African Americans for the week after the sign was removed. However, three weeks after the sign was removed, African American commuters had returned to their baseline levels while stair use among Caucasians remained elevated. Brownell et al. (1980) also reported a trend for African Americans to return to pre-intervention levels of

Table 1 Age, Weight and Race-specific percent of commuters walking the stairs before, during and after the placement of culturally appropriate sign designed to promote stair use.

Characteristic	Baseline			Sign up			Sign withdrawn 1 week			Sign withdrawn 3 week			Sign up 4 weeks after intervention			
	n	%	CI	n	%	CI	NNT	n	%	CI	n	%	CI	n	%	CI
Age																
<i>Caucasian</i>	1 184	24.7	22.2–27.1	1 131	31.5	28.8–34.2	14.7	700	29.4	26.0–32.8	599	28.5	24.9–32.2	548	29.2	25.4–33.0
Under 40 yrs	914	22.5	19.8–25.3	570	24.3	20.8–27.9	55.5	228	17.5	12.6–22.5	344	22.4	17.9–26.8	193	22.3	16.4–28.2
<i>African American</i>	1 864	11.2	9.8–12.7	1 987	17.5	15.8–19.1	16.9	963	16.1	13.8–18.4	967	12.0	9.9–14.0	719	13.5	11.0–16.0
Under 40 yrs	846	8.6	6.7–10.5	457	11.0	8.8–14.8	41.6	163	11.0	6.1–15.9	222	5.4	2.4–8.4	123	6.5	2.1–10.9
Overweight																
<i>Caucasian</i>	304	4.9	2.5–7.4	227	12.8	8.4–17.2	12.6	72	12.5	4.7–20.3	85	5.9	0.7–11.0	57	17.5	7.4–27.7
Overweight	1 891	26.1	24.1–28.1	1 557	30.5	28.2–32.8	22.7	894	27.6	24.7–30.6	887	27.6	24.7–30.6	715	27.9	24.7–31.3
<i>African American</i>	758	3.9	2.6–5.3	621	8.2	6.0–10.4	23.2	176	7.4	3.5–11.3	273	2.2	0.5–3.9	129	8.5	3.6–13.4
Overweight	2 011	12.6	11.2–14.1	1 860	19.1	17.3–20.9	12.6	973	16.7	14.3–19.0	948	13.1	10.9–15.2	728	12.9	10.5–15.4

stair use more rapidly than Caucasians. Furthermore, Kerr et al. (2001) reported that non-Caucasians that were observed in the study were the only sub-group that did not have significantly higher stair-use at a non-prompting follow up period when compared to baseline period without prompting. Since overall goals of public health interventions are to sustain physical activity habits, further research may be necessary to discover what approach may work best for sustaining physical activity behaviors such as stair climbing in non-Caucasian populations.

Taken together, these studies support the hypothesis that health messages and materials are most likely to be effective among the population group targeted to receive the message. The importance of designing health-related messages and materials that are based on motivational principles but tailored to be culturally relevant to minority groups such as African American adults is gaining wider acceptance. Strecher (2000) has noted that tailored messages can improve smoking cessation rates compared to a generic “one-size-fits-all” approach. We believe that one of the major reasons that our culturally sensitive sign was effective in increasing stair use among both male and female African American commuters was that the message and the mode (i.e., text and role models) were developed from input gathered from minority individuals who made up our focus groups, thus increasing the acceptability and salience of the message to this population. Although the sign created for this study contained an African-American woman using the stairs, our goal was to also target African-American men and we incorporated the important feedback from the male members of the African-American focus groups as well (using a role model that is attractive/fit and covering the issue of lack of time to exercise). Therefore, we were pleased to observe that both the African-American men and women responded to our culturally sensitive sign.

Methods of increasing physical activity in minority groups have important public health implications. We have previously reported that African American adults are more likely to report being sedentary in their leisure time than Caucasian Americans (Crespo et al. 2000). Stair climbing is a commonly cited example of a moderate intensity activity that can be easily incorporated into the daily routines of many individuals residing in urban settings.

At baseline, we also found that all commuters who were judged to be overweight used the stairs much less often than

their leaner counterparts. This is consistent with previous studies published by our group (Andersen et al. 1998) and others (Brownell et al. 1980). Interestingly, we found that all overweight people observed in the present study were more than twice as likely to walk up the stairs when cued by the sign. However, both groups regressed to baseline levels of stair use three weeks after the sign was removed.

This investigation also highlights the potential synergy that may occur when health care providers and members of the community work together to increase physical activity. Upon completion of this trial, a manager of the subway station where the intervention took place asked that we leave our sign in place, since he noticed that more people were using the stairs (thereby, freeing up space on the escalator).

One of the limitations of this study surrounds the potential biases that could be introduced by visually estimating age, race and body weight in commuters. It is possible that in some instances these parameters were not classified correctly, since measurements were in some instances taken very quickly. However, we do not think this limitation affects the interpretation of the results significantly since all investigators who recorded data spent an entire morning before the investigation began judging commuter’s age, race and weight and very good agreement was observed across recorders (REA, SCF, KBZ and ESC). Furthermore, we suspect that there is no reason to believe that misclassification of subjects’ race, overweight status or age would differ between various study periods since the observers encountered the steepest part of their learning curve during the morning training period.

In conclusion, we have shown that a low-cost, culturally sensitive sign can significantly increase the proportion of African American commuters who use the stairs rather than an adjacent escalator in an urban subway station. Given that stair use may be an efficient way to add physical activity into a daily routine, these findings have important public health implications. Future interventions should seek to examine how culturally sensitive health promotion messages can increase and sustain levels of activity in free-living environments.

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Zusammenfassung

Auswirkungen eines kulturell sensitiven Hinweisschildes zur Treppenbenutzung bei afroamerikanischen Pendlern

Fragestellung: Welche Auswirkungen hat ein kulturell sensitives Hinweisschild zur Förderung des Treppensteigens bei afroamerikanischen Pendlern?

Methoden: 16035 Pendler wurden in einer U-Bahn-Station beim Treppensteigen bzw. beim Benutzen der Rolltreppe beobachtet. Nach der Baseline-Beobachtungszeit wurde neben der Treppe bzw. neben der Rolltreppe ein kulturell sensitives Hinweisschild aufgestellt, das zum Treppensteigen anregen sollte. Demografische Angaben und die Nutzung von Treppe bzw. Rolltreppe wurden erhoben.

Resultate: Die Nutzung der Treppe stieg von 15,8 % auf 21,5 % während das Schild aufgestellt war. Anfangs benutzten 23,1 % der weissen Pendler die Treppe, während es mit Schild 28,3 % waren. Bei den Afroamerikanern stieg die Nutzung der Treppe durch den Hinweis von 10,3 % auf 16,4%. Afroamerikanische Frauen zeigten den grössten Anstieg bei der Nutzung der Treppe. Alle Pendler benutzten auch noch in der Woche nach Entfernung des Schildes öfter die Treppe als vorher. Bei den Afroamerikanern kehrte die Nutzung nach drei Wochen wieder zum Anfangswert zurück. Sowohl bei Übergewichtigen wie bei nicht Übergewichtigen Weissen und Afroamerikanern stieg die Treppennutzung signifikant an.

Schlussfolgerungen: Kulturell sensitive Interventionen können die körperliche Aktivität bei der afroamerikanischen Bevölkerung in urbanen Gebieten fördern.

Résumé

Effets d'une affiche montrant une femme afro américaine sur la promotion de l'utilisation des escaliers chez les pendulaires de cette origine ethnique

Objectifs: Examiner l'efficacité d'une affiche promouvant l'utilisation des escaliers chez les pendulaires afro-américains et tenant compte de leurs spécificités culturelles.

Méthodes: Observation de 16035 pendulaires en train d'utiliser soit les escaliers, soit les escaliers roulants d'une station de métro. Après une observation initiale, une affiche montrant une femme afro-américaine montant les escaliers a été posée près des escaliers et des escaliers roulants afin de promouvoir l'utilisation des escaliers. Des données démographiques ainsi que des données concernant l'utilisation des escaliers et des escaliers roulants ont été récoltées.

Résultats: L'utilisation des escaliers a augmenté de 15,8 % à 21,5 % suite à l'introduction de l'affiche. L'utilisation des escaliers par les pendulaires d'origine caucasienne est passée de 23,1 % à 28,3 %, celle des afro-américains de 10,3 % à 16,4 %. L'augmentation a été la plus importante chez les femmes afro-américaines. L'augmentation de l'utilisation des escaliers s'est prolongée chez tous les pendulaires sur la semaine suivant la suppression de l'affiche. Parmi les femmes afro-américaines, l'utilisation des escaliers est revenue à son niveau initial en trois semaines. L'utilisation des escaliers a augmenté significativement chez les pendulaires en surpoids et de poids normal (chez les pendulaires d'origine caucasienne aussi bien que chez les afro-américains).

Conclusions: Des interventions culturellement adaptées peuvent promouvoir l'activité physique en milieu urbain chez les personnes afro-américaines.

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