



Lessons learned from the development and implementation of a citywide stair prompt initiative

Karen K. Lee^{a,*}, Lawrence Loh^c, Johnny Adamic^d, Ashley Perry^e, Rachel Sacks^b, Kevin Lam^f, Steven Tong^g, Sarah Wolf^b

^a Division of Preventive Medicine, University of Alberta, Edmonton, AB, Canada

^b New York City Department of Health and Mental Hygiene, NY, NY, USA

^c Region of Peel – Public Health, Dalla Lana School of Public Health, University of Toronto, Toronto, ON, Canada

^d New York, NY, USA

^e Premier Healthcare Alliance, Washington, DC, USA

^f School of Medicine, Faculty of Health Sciences, McMaster University, Hamilton, ON, Canada

^g Faculty of Medicine, Queen's University, Kingston, ON, Canada

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ABSTRACT

Stair climbing is a readily available form of vigorous-intensity physical activity. Evidence indicates that placing stair prompt signs at points-of-decision (e.g. near elevators and stairways) is an inexpensive, effective strategy for increasing physical activity through stair use.

This article aims to share the experience of the New York City Department of Health and Mental Hygiene (NYC DOHMH) in the outreach and implementation of a population-scale stair prompt initiative, including lessons learned from process evaluations, with other public health authorities conducting a similar program. Between May 2008 and August 2012, NYC DOHMH implemented a stair prompt initiative as one strategy in a comprehensive program to increase physical activity and healthy eating through physical improvements to NYC's buildings, streets and neighborhoods, particularly targeting facilities in underserved and low-income neighborhoods. Program evaluation was conducted using program planning documents to examine the process, and data from NYC information line call center, outreach tracking database, and site and phone audits to examine process outcomes.

The initiative successfully distributed more than 30,000 stair prompts to building owners/managers of over 1000 buildings. Keys to success included multi-sector partnerships between NYC's Health Department and non-health government agencies and organizations (such as architecture and real estate organizations), a designated outreach coordinator, and outreach strategies targeting building owners/managers owning/managing multiple buildings and buildings serving underserved and at risk populations.

A NYC citywide initiative successfully distributed stair prompts to the wider community to promote population-level health impacts; lessons learned may assist other jurisdictions considering similar initiatives to increase physical activity.

1. Introduction

The rise of obesity in New York City (NYC) has paralleled secular trends in the United States (U.S.); the proportion of NYC adults meeting the definition of obesity rose from 18% in 2002 to 24.2% in 2012. Nearly 60% of NYC adults are considered to be overweight or obese, with the burden disproportionately impacting disadvantaged

populations (New York City Department of Health and Mental Hygiene, 2014). Research demonstrating the role of physical inactivity and unhealthy eating on these trends has increasingly shown that the human-made or “built” environment (BE)—our buildings, streets, neighborhoods and their amenities—plays a key role in supporting healthy behaviors (U.S. Community Preventive Services Task Force, 2016). Addressing BE improvements to support chronic disease prevention and

* Corresponding author at: Division of Preventive Medicine, Department of Medicine, Faculty of Medicine and Dentistry, University of Alberta, 5-30 University Terrace, 8303-112 St, Edmonton, Alberta T6G 2T4, Canada.

E-mail addresses: kkl1@ualberta.ca (K.K. Lee), lloh@jhsph.edu (L. Loh), Ashley_Perry@premierinc.com (A. Perry), kevin.lam@medportal.ca (K. Lam), swolf@health.nyc.gov (S. Wolf).

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address health disparities, through increasing physical activity and healthy food and beverage access, has been identified as a key component of the work in NYC (Lee, 2014).

Stair climbing is a readily available form of physical activity that increases caloric burn, and produces oxygen and heart rate responses sufficient for cardiovascular benefits (Meyer et al., 2009; Zimring et al., 2005; Helmrich et al., 1991). Among a suite of BE interventions to increase community stair use, research has demonstrated that placing point-of-decision stair prompt signs (“stair prompts”) near elevator call buttons and stairway entry doors is an inexpensive and effective strategy (Soler et al., 2010; Lee et al., 2012). On the strength of this evidence, the Guide to Community Preventive Services—developed through systematic literature reviews involving the U.S. Centers for Disease Control and Prevention (CDC)—recommends employing stair prompts as a strategy for increasing physical activity (Task Force on Community Preventive Services, 2010). Translating this recommendation into a population-based intervention by public health agencies, however, has previously occurred only on a very limited scale.

This paper describes the results of a program evaluation conducted on a novel initiative taken by NYC to distribute stair prompts for city-wide use. By highlighting lessons learned, this paper aims to provide guidance to other jurisdictions on rolling out, implementing and evaluating similar initiatives. Our initiative involved integrating an evidence-based intervention into a broader initiative that incorporated as part of a comprehensive strategy to promote physical activity in the community.

2. Methods

A systematic program evaluation examined three aspects of a NYC Department of Health and Mental Hygiene (DOHMH)-led stair prompt program: development, roll-out and scale-up, and process outcomes. Our assessment aligns with elements from the Medical Research Council's Process Evaluation of Complex Interventions framework (Moore et al., 2015). The evaluation captured descriptive information on vital aspects of intervention implementation such as fidelity, dose and reach.

2.1. Assessing fidelity

To assess the ease with which posters could be put up, responses were compiled anonymously from debrief interviews with key stakeholders and team members. These responses accounted for the initial multi-sectoral engagement process, identifying key elements that led to the creation of the guiding coalition, the development of the stair prompt, and program roll-out. This builds on a summary of the implementation of the program, with a focus on additional actions taken to optimize outreach and distribution within the community.

2.2. Assessing dose and reach

Process outcomes were examined, specifically exploring the uptake of signage. This was done by drawing on data from four sources: order tracking information from the city call center (311 phone line), in-person environmental audits of a sample of early-adopting sites to assess signage posting, data analysis (using Microsoft Excel®) of a Microsoft Access® outreach contact database, and a phone survey of all ordering entities.

In-person environmental audits were conducted in the spring of 2009 at 58 ordering sites to assess the extent of impact associated with stair prompts installed. A random sample of 30 of 180 initial ordering sites in Manhattan, Brooklyn and the Bronx were selected as well as 28 additional sites falling within walking distance of the 30 randomly-selected sites. The convenience sample of the additional 28 sites allowed the program to increase its sample sites for assessments for stair prompt implementation with only a minimal addition of travel and human

resources. Follow-up phone surveys with all ordering entities were conducted in 2012 to assess stair prompt use and to document reasons for non-use using a standard question list. Organizations were contacted by telephone; two attempts were made.

Employing this approach allowed the development of a broad overview of the program, along with lessons learned, as well as key process outcomes, such as the total number of stair prompts ordered, the ordering entities over the life of the program, and the actual use of stair prompts by the ordering entities.

3. Results

3.1. Process review: development of multidisciplinary stakeholder guiding team and stair prompt signage

The convenor for this program was the NYC DOHMH, which, in 2006, launched its Built Environment Program (BEP) within its Bureau of Chronic Disease Prevention and Tobacco Control. The BEP has since worked with BE-oriented stakeholders to identify and implement evidence-based interventions to improve the city's buildings, streets and neighborhoods to support active living and improve healthier food and beverage access for city residents.

In 2006, the DOHMH BEP convened a citywide half-day “Fit City” conference, the first of a now-annual gathering of public-private professionals from diverse disciplines, including health, design, architecture, construction, urban planning, transportation, housing, school construction, and parks and recreation, to identify collaborative solutions to the epidemics of obesity and chronic diseases. Following the first conference, a Fit City Report was released with recommendations by the American Institute of Architects, New York Chapter (AIANY). One specific recommendation was to create and distribute new stair prompt signage with integrated health and environmental sustainability messages (Lee et al., 2012; American Institute of Architects New York Chapter, 2008).

The DOHMH BEP engaged key BE stakeholders as partners from the very start of the process, reaching out to participating organizations at and after the first Fit City conference. The recommendation to synergize the City's priorities of health and environmental sustainability guided the selection of DOHMH BEP's core partners in the stair prompt program: the Mayor's GreenNYC Office, AIANY, and the Real Estate Board of New York (REBNY). In the initial phases focused on developing stair prompt signage, these partners engaged the Graphic Design Program of the New York City Department of Design and Construction, which provides design services for City agencies.

Initial meetings in 2006 and 2007 focused on reviewing potential signage messaging and graphic options. Using an iterative process, core partners ultimately selected a graphic depicting a stick figure walking upstairs, with the tag line, “Burn Calories, Not Electricity. Take the Stairs!” A sub-message reinforcing stair climbing and its benefits for weight gain prevention - and the environment - was also added: “Walking up the stairs just 2 minutes a day helps prevent weight gain. It also helps the environment.” The prompt was a two-colored sign of white graphics and wording on a bright green background. Since this was a City of New York initiative, the Mayor's name was also listed on the stair prompt sign, originally Mayor Michael R. Bloomberg and later changed to Mayor Bill De Blasio. Partner logos were also incorporated into the signage to identify their endorsement. The prompts were developed in two different sizes (8.5” × 11” and 11” × 14”) and materials - styrene plastic and laminate poster. As is common practice with other DOHMH materials, the program relied on DOHMH-related translation services that regularly and accurately translates DOHMH materials into English, Spanish, and if needed for target populations, other languages also. In this initiative, translation services helped the program to produce the stair prompts with the same messaging in two languages, English and Spanish. Through further discussion, the core group of partners, inclusive of built environment professionals such as architects



Fig. 1. Stair prompt signage, English and Spanish. The stair prompts feature a pictograph of a stick figure climbing a set of stairs with the text “Burn calories, not electricity”. Similar phrasing appears in the translated Spanish version.

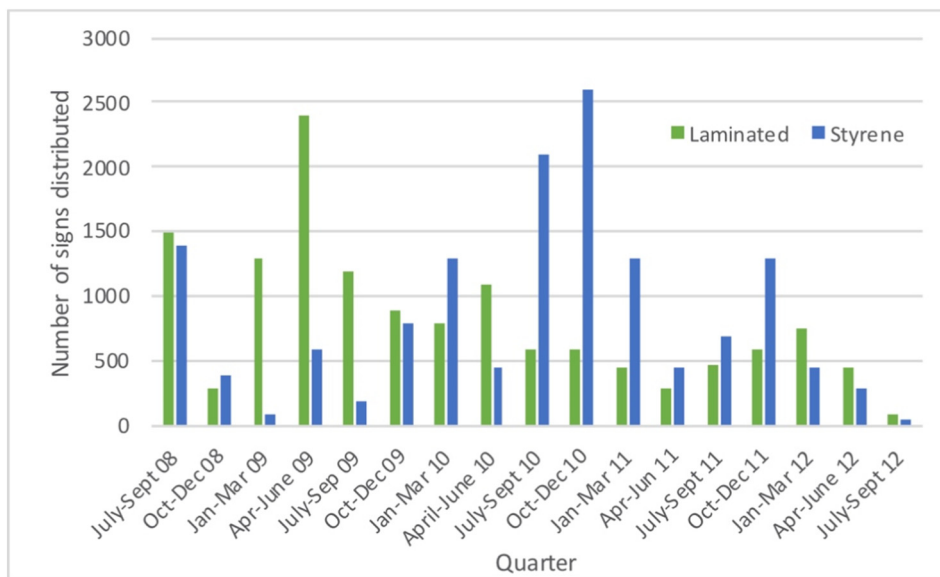


Fig. 2. Stair prompt distribution by quarter, May 2008–August 2012, comparing posters of different material.

and facilities experts, recommended the use of styrene plastic signage for permanent and semi-permanent posting in building lobbies, at elevator call areas, and outside stairwells, while less expensive laminate posters were earmarked for dissemination at meetings and in promotional efforts, and as supplementary temporary signs in non-point-of-decision building areas, such as community rooms and mailrooms (Figs. 1 and 2).

3.2. Process review: implementation

The signage was launched formally at the Fit City 3 Conference in May 2008, accompanied by a media release (American Institute of Architects New York Chapter, 2008). Stair prompts were made available for free through 311, NYC's non-emergency information line, and were promoted by each of the core partners to their constituents and members including real estate developers and facilities professionals. Following launch, the BEP also expanded its reach beyond core partners to contact other organizations of interest such as the New York State

Table 1
Detailed categories of organizations ordering stair prompts, March 2010–March 2012.

Category of requesting organizations	Total organizations in category	Number of signs in category	Percentage of total signs distributed
University/college	48	2833	19.5%
Department of Health and Mental Hygiene (internal)	38	2382	16.4%
Affordable housing development	21	2347	16.2%
Healthcare or related	69	2070	14.3%
Government/public agency	39	1297	9.0%
School	87	941	6.5%
Community-based organization	51	866	6.0%
Real estate/building management	11	626	4.3%
Unknown	37	307	2.1%
Architecture firm	8	300	2.1%
Library	20	127	0.9%
Faith-based organization	29	118	0.8%
Childcare center	68	103	0.7%
Individual	12	64	0.4%
Museum	1	50	0.3%
Business entity	7	24	0.2%
Total	553 organizations	14,508 prompts	100.0%

Association for Affordable Housing, and the New York City Food and Fitness Partnership. Operators on the 311 calls were instructed to collect information on callers ordering stair prompts, including callers' organizational affiliations and information, and number of prompts ordered. In 2008–09, DOHMH printed 20,000 stair prompts, and also hired a part-time intern to assist with outreach and distribution to building owners. Building owners/managers/organizations could order up to 200 stair prompts, while individuals were allowed to order up to 20 signs.

Additional scale-up took place in 2010 with the DOHMH receiving a two-year Communities Putting Prevention to Work (CPPW) grant from the CDC to support initiatives involving environmental improvements to address obesity and chronic diseases, including this initiative (Bunnell et al., 2012). This grant supported additional stair prompt printing during 2010–2012 and the hiring of a full-time Buildings Outreach Coordinator (“Coordinator”), allowing expansion of outreach. Notably, owing to a quality improvement process undertaken by the Coordinator, orders since 2010 have included appropriate adhesive materials and posting instructions.

Under the guidance of the Built Environment Director, the Coordinator focused on outreach that would maximize impact while minimizing resource burden. Outreach sites were prioritized according to the owner's or institution's perceived commitment to health and/or environmental sustainability issues; types of buildings, with emphasis to include buildings serving underserved and disadvantaged populations, such as affordable housing developments; location of buildings, with preference given to those located in areas impacted by the greatest health disparities (DPHO neighborhoods); and number of buildings under a single entity's control.

The Coordinator's outreach concentrated on hospitals, university and college campuses, and affordable housing developments where a large number of buildings could be impacted from approval by a single facility owner/manager. Additional outreach was conducted to human resource organizations, wellness programs, and buildings with Leadership in Energy and Environmental Design (LEED) or Energy Star green building certification since such certifications were an increasingly common practice. The Coordinator provided active guidance to all ordering building owners and managers on stair prompt use and installation, and also distributed the NYC *Active Design Guidelines*, published in January 2010, to building owners and managers. This effort was designed to help inform partners about additional strategies they could consider to promote physical activity within their buildings, on their sites and in their neighborhoods (City of New York, 2010).

3.3. Program evaluation

Overall program evaluation included outcome and process evaluations. Initial outcome evaluations of stair prompts used at three early-adopting buildings demonstrated immediate effect in encouraging increased stair usage, including stair climbing, with follow-up confirming continuation of longer-term behavioral change from baseline (Lee et al., 2012). The specific outcomes of this program have now been reported in two previously published papers that showed an association between increased stair use, including stair climbing, and stair prompt posting across different buildings, including multiple city-owned worksites, an 8-story academic building, and a 10-story affordable housing building in the South Bronx (Lee et al., 2012; Ruff et al., 2014). These buildings represented a sample of City of New York and partner organization buildings chosen for their diverse mix of building types (City government worksites, health clinic, academic institution, and affordable housing), heights, and locations across different boroughs.

Nine-month follow-up at the affordable housing building showed sustained increases in stair use (Lee et al., 2012). The prompts were also associated with increased stair climbing, a vigorous-intensity physical activity (Lee et al., 2012). In view of previously published evidence on these positive outcomes, our continued evaluation instead used process indicators as a proxy for these associated outcomes on a broader scale. The process evaluation also informed our implementation process by identifying areas of needed improvement. For example, through our process evaluations, the program was able to improve the types of prompts being ordered and organizations in need of further outreach.

During May 2008–August 2012, over 30,000 stair prompts were ordered by building owners/managers of over 1000 buildings; 48.4% of these (14,508) were ordered during the Building Outreach Coordinator's tenure and recorded in the outreach database (Table 1).

Universities/colleges proved the most successful settings for signage orders; for example, the City University of New York (CUNY), the nation's largest urban university, used 1000 signs in 400 buildings on 20 of its 23 campuses. Focusing efforts on government sector buildings and healthcare-related buildings also resulted in successful implementation. Targeting owners/managers of large affordable housing developments in the South Bronx, North/Central Brooklyn and East/Central Harlem also proved successful and allowed for prioritization of populations affected by health disparities.

From data collected through both in-person environmental audits and telephone surveys, approximately 50% of ordering organizations are estimated to have posted the prompts. Telephone respondents were also asked to identify barriers to installation. The main documented concerns included legal liability fears from stair use, concerns about stair upkeep (e.g. cleaning, vandalism), and building policies requiring

stairs to be locked due to safety concerns. Restricted stair access and failure to coordinate installation with or approval from building management were commonly reported reasons for stair prompt non-installation. These barriers as identified were systematically addressed to complement the stair prompt promotion; however, the specific impacts from addressing the barriers were not formally assessed as part of this study.

Notably, hiring a full-time Coordinator in 2010 increased program success. Orders of permanent signage (styrene prompt) increased from 4707 prompts (46% of 10,164 ordered) during May 2008–February 2010 to 9722 (67% of 14,508 ordered) during March 2010–March 2012. The Coordinator also assisted in troubleshooting problems as they arose, and provided technical assistance to building owners in placing signs correctly and effectively. For instance, in 2010, after observing incorrect posting of the styrene signs with nails or insufficient adhesive, the Coordinator modified the signage package to include appropriate adhesive materials and posting instructions.

3.4. Summary of lessons learned

Seven key strategies were identified as instrumental to the initiative's success:

1. Engagement of core partners from multidisciplinary backgrounds in design, architecture, and real estate development/management fields;
2. Development of signage messaging incorporating health and other benefits aligned with local jurisdiction and stakeholder priorities (e.g. environmental sustainability);
3. Including, as a focus of outreach and signage distribution efforts, areas with the greatest health disparities as well as buildings serving disadvantaged populations;
4. Prioritizing building owners/managers who control multiple multi-story buildings. Universities/colleges, large affordable housing developments, health care institutions and governmental agencies are examples of entities where ownership or management of multiple buildings by a single entity could result in wide reach, resulting in signage posting across many sites even with limitations in outreach resources;
5. If resources permit, hiring a part-time, or preferably full-time, staff member to conduct outreach, facilitate dissemination of signage, assist with proper posting of the signs, troubleshoot issues with building owners/managers that can result in non-posting, and promote additional physical activity and health-promoting building strategies;
6. Identifying challenges to installation such as restricted stair access, and perceived safety and liability concerns so they can be directly addressed;
7. Designing a comprehensive evaluation plan to capture process and outcomes data throughout the program's lifespan, and especially in the initial years of the program to understand local effectiveness and needed implementation improvements.

4. Discussion

This review and program evaluation demonstrates that widespread implementation of stair prompts can occur with some dedicated resources for printing and distributing the signage, and through key partnerships between health departments and non-health organizations with expertise in designing, constructing and maintaining buildings. Dedicated staffing resources (e.g. a Coordinator) for targeted outreach was also helpful. In NYC from 2008 to 2012, over 30,000 stair prompts were disseminated to the owners/managers of over 1000 buildings. Approximately 50% of ordering organizations are estimated to have posted the prompts. These numbers highlight the potential community impact arising from greater stair use by prompted New Yorkers.

Outcome evaluations conducted across various NYC sites have demonstrated both short-term and longer-term increases in stair use (Lee et al., 2012; Ruff et al., 2014).

Complementary work will likely be needed to address key common barriers to stair prompt use, including stairwell access, and perceived legal liability and safety concerns. NYC DOHMH's BEP has been undertaking work on these issues. In early years of the initiative, collaborative work was undertaken with building security and fire safety leadership to develop feasible building scale changes. For example, by working with the police chief assigned to DOHMH buildings, some building floors with higher security offices whose stairwells used to be locked were retrofitted with cardkey or code locks directly onto the hallway doors entering into these offices and opening up the stairwell doors onto these floors. Promotion of stair use can also synergistically promote awareness of stair location for emergency egress and framed this way, can find an ally in fire safety leadership. In later years of the initiative, broader policy development measures were enacted. Stair access and stair prompt use – and better-designed stairs through the *Active Design Guidelines* (City of New York, 2010) - are now promoted in city-owned buildings, via Mayoral Executive Order; legislation has also been introduced to include stair access and stair prompts in all new building construction and major renovations (Bloomberg, 2013; New York City Council, 2013). DOHMH BEP partnered with ChangeLab Solutions to assess liability risks for stairs. ChangeLab Solution's analysis concluded that “accessible stairwells appear to pose no more legal risk than other common areas within a building” (Public Health Law and Policy, 2012). Other barriers that have been studied can be addressed through simple retrofit measures. Zimring et al. have previously described interventions, such as including art, music, and improved lighting in staircases (Zimring et al., 2005). In new buildings, stair visibility and natural lighting can be improved, and have been demonstrated to be associated with increased stair use (Ruff et al., 2014; Nicoll, 2007). More innovative solutions have included elevator design and programming, such as decreasing immediate visibility of elevators at building entrances and the programming of elevators to “skip-stop”, elevators that don't stop at every floor except for the one elevator for disability access (Nicoll and Zimring, 2009).

5. Conclusions

The NYC DOHMH BEP stair prompt initiative demonstrated that widespread community distribution of stair prompts is a feasible built environment intervention, particularly if partner organizations in design, architecture, and real estate development/management fields support message development and outreach. Successful distribution and placement is also associated with dedicated staffing resources and outreach guidelines that target facilities that share health and other key priorities addressed by the prompts as well as outreach to building owners/managers with control over multiple multi-story buildings, which optimizes limited outreach resources. Finally, outreach targeting buildings in high needs neighborhoods and serving disadvantaged populations presents opportunities for addressing health disparities.

Our program's success has led health authorities elsewhere (e.g. Baltimore, MD, Portland, OR, and London, UK) to adapt the NYC stair prompt into similar programs. The NYC experience with stair prompts highlights their feasibility as a community-wide intervention within a comprehensive BE approach to encourage physical activity through stair use.

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Conflict of interest

The authors declare there is no conflict of interest.

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