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Using the Online Walking Journal to explore the relationship between campus environment and walking behaviour

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1. Introduction

The US and most developed economies are experiencing an epidemic of chronic diseases related to physical inactivity and obesity. More than 50% of Americans fail to achieve the Surgeon General's recommendation of 30-minute moderate activity on most days, resulting in some 200,000 unnecessary deaths due to stroke, cancer, obesity and diabetes annually (Jones et al., 2003; CDC, 2001; Kahn et al., 2002).

Now compelling evidences suggest physical activity can benefit adults in numerous ways: preventing and treating chronic illnesses and improving physiological and psychological health (Sener et al., 2016; Lee et al., 2012). Furthermore, walking constitutes the most popular habitual physical activity because it can be done at any time, alone or in the company of others, requires no special equipment or clothing, and can easily be incorporated into one's daily routine (Hamdorf et al., 2002; Tudor-Locke et al., 2002).

Built environment has increasingly been recognised as crucial correlates of walking. The key features influencing the walkability of a neighbourhood environment are the distance to various activity-promoting destinations; connectivity to sidewalks and off-site destinations; availability of trails, sidewalks, or paths for walking; availability and types of food sources; urban greenness; and availability of and proximity to transportation alternatives (Handy et al., 2002; Ding and Gebel, 2012; Saelens and Handy, 2008; Adams et al., 2016). However, most empirical studies focus on residential neighbourhoods with very few exceptions investigating campus environments, such as corporate campus or university campus.

1.1. Corporate and university campuses

Recently, corporate and university campuses have attempted to explicitly encourage physical activity by incorporating design interventions that facilitate and increase walking, such as providing remote park lots and pedestrian-friendly design.

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As an example, the 200-acre Sprint-Nextel headquarters in Kansas City, US has used features such as remote parking lots, peripheral cafeterias, convenience stores and attractive walking paths to promote activity-friendly behaviour among its 14,000 employees.

Corporate and university campuses can be emerged as fruitful foci for design intervention for many reasons. Firstly, the centralised land control and single-ownership of a corporate campus make it easier to introduce targeted interventions, especially when compared to a neighbourhood setting. Secondly, campuses play a significant role in Americans' physical activity opportunities. Approximately 20.5 million students were admitted to universities or colleges in United States in 2016 (Snyder et al., 2016). Americans also spend a majority of their day at work, and studies of activity patterns suggest that the workplace is second only to home as a base for activity trips (Wegmann and Jang, 1998).

While it is plausible that physical design is associated with walking behaviours in working campus and its surroundings, there has been scant evidence to support such hypothesis (Zimring et al., 2005). Opportunities and strategies to promote physical activity on campuses have been poorly researched and largely ignored by the public health community (Leslie et al., 2001). The barriers to expanding knowledge at the campus site scale are partially methodological. Few efficient tools can measure and describe activity-influencing physical environments as well as collect walking behaviour data at the campus-level spatial scale.

1.2. Measuring the features of sites

Researchers in environmental psychology and public health have introduced a number of self-reported and field observational assessment tools to explore global characteristics such as sprawl. A self-reported survey was used to capture residents' subjective perceptions of the features of their neighbourhood environment including residential density, land-use mix, neighbourhood aesthetics and safety (Saelens et al., 2003). These field observational assessment tools typically score each path segment according to numerous building and streetscape features, such as the sidewalk size and condition, and building setbacks (Clifton et al., 2007; Day et al., 2006; Pikora et al., 2002). The features are often aggregated into larger constructs, such as safety and aesthetics. The Irvine-Minnesota Inventory is an example of such a tool that has been validated for studying the relationships between environment and exercise behaviour (Boarnet et al., 2011).

While some recent scales have been developed to measure the characteristics of urban sidewalks, these have not been validated at the campus scale (Moudon and Lee, 2003). Campus paths and walkways often differ from urban sidewalks. Unlike most urban sidewalks, campus paths are often curving, seperated from vehicular streets, and sometimes covered by a shelter.

1.3. Measuring walking behaviour

It is often costly and difficult to measure walking behaviour at the campus scale. Direct observations is resource-consuming and cumbersome; while indirect measures such as self-reported surveys often cannot catch the sufficient details of walking routes, destinations or intentions. Yet a detailed study of the locational information of outdoor walking is needed to provide a better understanding of how physical activity varies in different environments (Krenn et al., 2011).

Portable Global Positioning System (GPS) units have become more accurate, allowing researchers to objectively track an individual's location. A small number of studies have taken advantage of GPS units combined with accelerometers to conduct more detailed investigations of the spatial and physical activity patterns associated with walking behaviour. Recently, one such study found that green environments such as gardens, parks, grasslands and farmland supported vigorous activity among 100 English children aged 9–10 years old (Coombes et al., 2013). However, factors such as an inherent inability to assess participants' intentions to walk, participant burdens, unit costs and the logistical difficulties of data collection have all discouraged the use of these GPS units at campus sites (Wheeler et al., 2010; Wieters et al., 2012; Maddison and Mhurchu, 2009).

The present study addressed these problems in two ways. Firstly, we developed a Web-based mapping questionnaire called the Online Walking Journal allowing participants to report their daily walking data, including walking origins, destinations, routes and intentions. Secondly, we used these data to examine how environmental characteristics predicted the frequency of use of different path segments on a corporate campus in US. We hypothesized that the physical design factors supporting walking behaviours in residential neighbourhoods were also effective at corporate campuses.

2. Methods

The case study was conducted at the Sprint-Nextel's corporate campus in Overland Park, Kansas. At this site, we collected data about each path segment's physical characteristics using a modified environmental audit tool. Subsequently, participant's reported walking behaviour was captured through the Online Walking Journal.

2.1. Setting

Sprint-Nextel's 200-acre corporate campus is in Overland Park, Kansas. It comprises 20 office buildings and 14 parking buildings, and accommodates more than 14,000 employees. Many design features such as remote parking lots, generous

Fig. 1. The built environment of Sprint-Nextel's corporate campus, the aerial view of the campus (on the left), and the pedestrian environment (on the right). (Source: Google maps, 2016).

pedestrian environment, presence of shops and cafeterias were intentionally designed to promote walking behaviour (Fig. 1).

2.2. Audit tool

Prior to this study, there were few tools developed specifically for measuring campus environmental attributes. Dannenberg et al. (2005) developed a workplace audit tool for evaluating pedestrian facilities, route maintenance, walkway width, and aesthetics. We developed a more comprehensive audit tool by combining two previously tested audit tools, the Systematic Pedestrian and Cycling Environmental Survey (Pikora et al., 2002) and the Irvine Minnesota Inventory (Boarnet et al., 2011; Day et al., 2006).

We modified these tools by adding audit items to fit them to campuses. The final audit tool comprised 18 items with specific coding conventions for later data analysis (as illustrated in Table 1). The auditors of the physical environment went through field training, until a reasonable inter-rater reliability was achieved (percentage agreement was $>80\%$; Cohen's Kappa values were typically >0.75).

Two trained auditors assessed all of the path segments at Sprint-Nextel's campus over a three-day period. A path segment in the study is defined as a section of a pedestrian walkway between two intersections within a network of pedestrian walkways. There were 328 path segments longer than 1 m (m). The path segment length ranges from 1.1 m to 417 m with a median length of 28.9 m (M=40.3 m, SD=38.5 m). Photographs of all of the buildings, parking lots and path segments were taken and used to build the Online Walking Journal tool.

2.3. The Online Walking Journal tool

The self-report portion of the Online Walking Journal tool was built using *scalable vector graphics* (SVG), describing graphic objects with mathematical descriptors rather than rasterised bits of information. Because SVG objects are created with discrete statements, objects can be made interactive when paired with Java script code, e.g. lines can change colour when the mouse is moved over them, or when the object is clicked.

The user interface of Online Walking Journal has three distinct areas (see Fig. 2): the main map is the area in which a user selects a path; the mini-map allows the user to shift the location of the main map to see a larger portion of the campus; the information area provides the names of buildings, well-known path segments as well as pictures of these areas.

The participants were asked to use a mouse to click path segments, buildings and open spaces to trace the path route that they took. After entering a path, the user clicked the ‘submit’ button, and was presented with four multiple-choice questions related to the path taken, including the date and approximate time of the trip, the purpose of the trip and the speed of travel. The information was then stored in a database.

2.4. Participants

The study aimed to establish information about the walking behaviour of the individuals who worked at Sprint-Nextel campus. These participants were recruited through email. Because the Online Walking Journal requires the use of a computer, the researchers accepted that there would be a small number of employees who would be excluded because of a lack of email addresses. Fifty-four people volunteered for this study out of 300 invitations, and they received no monetary

Table 1
Built environment audit tool for path segment in campus settings.

Item description	Item question and responses (coding)	Source
Path type	*What is the path type?* Next to vehicle street (0) Within the landscape (1)	New
Path condition	*Is the path well maintained*? Poor/Undergoing work (0) Moderate/Good (1)	SPACES
Path slope	*How steep is the path?* Flat/Gentle (0) Moderate/Steep slope (1)	IMI, SPACES
Path width	*How wide is the path?* Less than 5 feet (0) 5.1 feet to 10 feet (1) 10.1 feet and above (2)	SPACES
Presence of landscape areas	*Are there landscape areas along the path?* No (0) Yes (1)	SPACES
Landscape maintenance	*Are the landscape areas along the path well maintained?* Poor/Undergoing work (0) Moderate/Good (1)	SPACES
Presence of buildings	*Are there buildings along the path?* No (0) Yes (1)	SPACES
Building maintenance	*Are the buildings along the path well maintained*? Poor/Undergoing work (0) Moderate/Good (1)	SPACES
Surveillance from buildings	*Can others observe pedestrians through passive surveillance from buildings*? Poor (0) Moderate/Good (1)	SPACES
Surveillance from highly used outdoor activity area	*Can others observe pedestrians through passive surveillance from highly used outdoor activity areas such as plazas or outdoor dining areas?* Poor (0) Moderate/Good (1)	New
Presence of lighting	*Does lighting cover the path area?* No (0) Yes (1)	SPACES (modified)
Covered by shelters	*Is the path protected from sun and rain with shelters?* No (0) Yes (1)	New

Table 1 (*continued*)

Item description	Item question and responses (coding)	Source
Presence of walking amenities	*Are the outdoor amenities such as benches, drinking fountains, trash bins or phones along the path?* No (0) Yes (1)	IMI
View of landscape features	*Are there interesting and different views such as public art, water fountains, trees, etc. along the path?* No (0) Yes (1)	SPACES (modified)
Presence of natural features	*Are there natural features such as lakes/ponds, wooded areas or streams/rivers along the path?* No (0) Yes (1)	SPACES (modified)
Presence of public spaces	*Are public spaces such as parks/gardens, plazas, sport fields or lawns along the path?* No (0) Yes (1)	SPACES (modified)
Presence of facilities	*Are facilities such as shops, restaurants or services along the path?* No (0) Yes (1)	SPACES (modified)
Connection to off-site destinations	*Is this path segment directly connected to the offsite features or locations such as offsite retail, services or residential areas?* No (0) Yes (1)	SPACES (modified)

incentive. The response rate was 18%. The study was approved by Institutional Review Board of Georgia Institute of Technology.

2.5. Procedure

After registering for a user name and password, first-time users of the Online Walking Journal self-report tool were presented with a demographic survey along with instructions on how to use the tool. The survey collected individual-level demographic information related to physical activity levels, as evidenced from prior studies. It included questions on gender, age, education (high school graduate or less, college graduate, post graduate), health condition (poor, fair, good), walkability (not at all difficult, somewhat difficult, very difficult), and information that the researchers believed might be correlated with on-the-job physical activity levels, such as type of job (managerial, technical, professional or other), time working at the campus ($<$ 6 months, 6 months-2 years, $>$ 2 years), sitting time at work a day ($<$ 4 hours, 4–6 hours, $>$ 6 hours), typical physical activity level during last seven days using validated International Physical Activity Questionnaire short form (low, moderate, high).

The participants were then asked to report their walking behaviour for five consecutive workdays from Monday to Friday. Users were free to enter data into the Online Walking Journal at any time during the day.

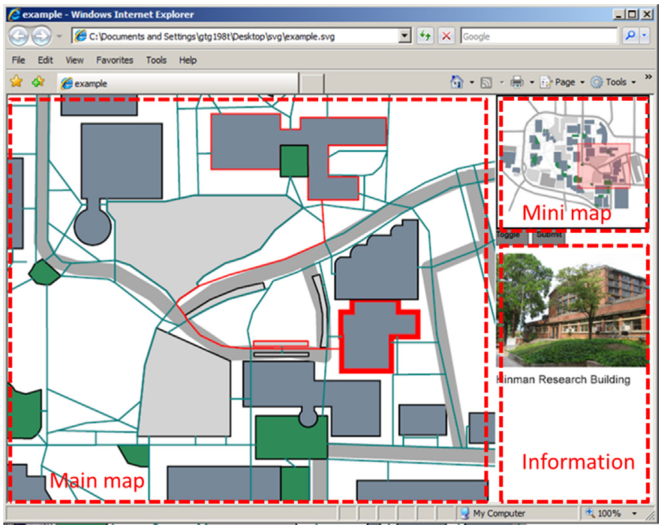

Fig. 2. Online Walking Journal path selection interface.

3. Results

3.1. Descriptive statistics and demographic variables

The results showed that user participation, in terms of the number of recorded trips and of people using the Online Walking Journal, dropped steadily over the five-day period. The total number of recorded trips of all of the participants per a day decreased 35% from Monday to Friday (from 177 to 131 trips) (Fig. 3). However, the average number of trips recorded by a person each day increased over the week from 3.2 to 3.7 (Mean=3.5, SD=0.6). The participants recording more trips tended to use the Online Walking Journal for a longer period of time than those recording fewer trips.

The results also showed that our participants did not walk very much on campus. On average, people made 3.5 walks a day on campus and the trips were short (M=102 m, SD=63 m). Most were made at a normal pace (79.2%), and the rest were brisk or fast (20.8%). These trips were evenly distributed throughout the day (37.8%, 30.2% and 31.9% at 6 a.m.–10 a.m., 10 a.m.–2 p.m. and 2 p.m.–6 p.m., respectively). Furthermore, the majority of the trips were utilitarian walks (63.9%, 9.6% and 26.5% for utilitarian, combined and recreational walks respectively). As expected, participants walked faster during utilitarian trips than during recreational trips ($\chi^2(1)=50.08$, $N=684$, $p<0$ .05). Furthermore, the mean recreational trips were longer than utilitarian trips (120 m vs. 87 m, $F=3.35$, $p<0.05$).

Majority of participants were professionals (62.9%), while the remaining were managers (22.2%) and technicians (14.8%). There were more female (62.9%) than male (37.1%) participants. Respondents were generally sedentary at work with 59.2% sitting for more than 6 hours at work each day, 22.2% sitting for 4–6 hours, and only 18.5% sitting for less than 4 hours.

The walking behaviours were further analysed at individual level. General linear models were used to test if demographic factors and physical activity level were associated with walking. The results showed that job type and site time at work was significantly associated with total walking distance, while other individual factors were not. People sitting for more than 6 hours a day walked for longer distance than those sitting less than 4 hours (524 m vs. 274 m, $p<0.01$). We believed that people siting less during work may have adequate indoor walking or standing which largely replaced outdoor walking. Technicians walked longer than professionals (506 m vs. 288 m, $p=0.03$) and managers (506 m vs. 223 m, $p<0.01$). It is plausible that the technical jobs required access different buildings on the campus, and thus contributed to more outdoor walking than other types of jobs.

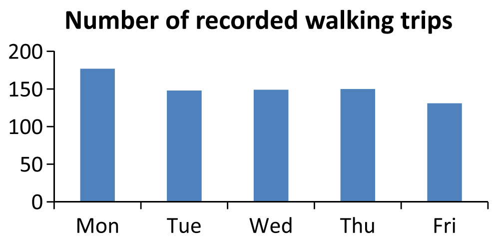

Fig. 3. The total number of walking trips recorded on the Online Walking Journal from the first to the fifth day.

3.2. Outcome variables: the path segment use

All data obtained from the field audit and the Online Walking Journal were entered into SPSS 19. Path segments were employed as the fundamental unit of our analyses to identify specific environmental factors which are associated with path segment use.

The descriptive statistic revealed a large percentage of path segments were not used at all, and a small percentage was used frequently. Only 35.4% of all path segments were used at least once for utilitarian walking, and only 23.5% of path segments were used at least once for recreational walking. Given the binary nature of the outcome variables, Path segment use was coded as binary variables - those that "were not used at all" and those that "were used" for utilitarian walking and recreational walking respectively. Thus, the present study employed two binary outcome variables, expressed as:

1) the propensity/odds of a specific path segment being used for utilitarian walking, and
2) odds of a specific path segment being used for recreational walking.

3.3. Independent variables

All of the path characteristic variables were coded into binominal variables (such as yes/no, high/low) or ordinal variable (such as flat, moderate slope, steep slope). The independent variables were obtained from field observation and recorded using the environment audit tool.

3.4. Multiple logistic regression

Binary logistic regression models were used to identify the key environmental path-segment characteristics (from the list of variables found to be significant in a chi-square analysis) predicting the probability path segment use for recreational or utilitarian purposes. Results were expressed as beta, respective odds ratio and standard error.

For the utilitarian walking, the results showed path segment use was significantly associated with presence of buildings ($p < 0.01$, $OR=3.138$), and better surveillance from buildings ($p < 0.01$, $OR=2.72$). The combined effect of presence of buildings and surveillance from buildings was also statistically significant ($\chi^2(2)=28.22$, $p < 0.01$). The model explained 11% (Nagelkerke R^2) of the variance in path use and correctly classified 64.6% of the cases (Table 2).

For the recreational walking, the results showed that path segment use associated with the presence of shelters ($p < 0.01$, $OR=3.41$), presence of a better view of landscape features ($p < 0.01$, $OR=3.51$), or path type of being located in landscape (vs. next to street) ($p=0.02$, $OR=2.19$). The combined effect of shelters, a better view of landscape features and location in a landscape setting was also statistically significant ($\chi^2(3)=38.94$, $p < 0.01$). The overall model explained 31% (Nagelkerke R^2) of the variance in path use and correctly classified 76.5% of the cases (Table 2).

4. Discussion

A growing body of studies have documented consistent association between walking and built environment factors such as density, distance to non-residential destinations and land-use mix (Handy et al., 2002; Ding and Gebel, 2012; Saelens and Handy, 2008). Although these studies are providing an increasingly clear picture of what makes a walkable residential neighbourhood, it is also useful to consider the walking experience on campuses. Our study addressed this gap by focusing on walking behaviours at a corporate campus in US.

In the current case study, several physical environmental characteristics of path segments were identified and associated with path choice in utilitarian and recreational walking behaviour on a corporate campus. Path segments that were located next to buildings and those that had better surveillance were more likely to be used for utilitarian walking. In other words, path segments that were more accessible from buildings are related to higher levels of utilitarian walking. This is reasonable, as buildings were both the origin and destination of utilitarian walking at this campus. It is worth noting the campus has a large outdoor area built for outdoor physical activity, with a great open lawn, and many walking trails (in the bottom right corner on the campus map in Fig. 4). However, the observational data indicate that this area is rarely used for any walking activities. This exemplifies the fact that creating provision for physical activity facilities or area alone cannot promote walking. The spatial connectivity between that fitness area and the rest of campus is a crucial factor and may account for the underutilization of that area.

The finding that utilitarian walking was clumped on paths which were close to buildings, indicated that accessibility to destinations is associated with walking on a corporate campus. The result echoes with similar conclusion from studies in residential settings. Accessibility based on distance to destinations, or land use mix is associated with more walking in neighbourhoods (Saelens and Handy, 2008). For example, land-use mix and neighborhood density was positively associated with walking activity in lower ranges of land-use mix or density (Sung et al., 2014; Cho and Rodriguez, 2015; Lu et al., 2016).

The path segments located in landscape settings (vs. next to a street), those covered with a shelter, or with better views of landscape features were more likely to be used for recreational purposes. This suggests that the attributes that increase aesthetic and comfort may influence individual path selection for recreational walking trips. The studies of neighbourhood

Table 2
Summary of logistic regression analysis for variables predicting path segment use for utilitarian walking (n=328) and recreational walking (n=328).

Predictor	Utilitarian walking			Recreational walking		
	B	*SE B*	*OR*	B	*SE B*	*OR*
Path type	0.12	0.34	1.13	0.77*	0.39	2.19
Path condition	0.96	0.86	2.61	0.42	0.88	1.53
Path slope	0.26	0.35	1.29	0.17	0.42	1.18
Path width	0.20	0.35	1.22	0.07	0.44	1.07
Presence of landscape areas	0.33	0.37	1.40	−0.36	0.40	0.69
Landscape maintenance	0.47	0.26	1.60	0.22	0.25	1.25
Presence of buildings	1.14*	0.37	3.13	0.81	0.43	1.25
Surveillance from buildings	1.01*	0.40	2.72	0.59	0.43	1.81
Surveillance from highly used outdoor activity area	0.30	0.29	1.35	−0.04	0.33	0.95
Presence of lighting	0.56	0.32	1.76	0.63	0.35	1.87
Covered by shelters	0.31	0.46	1.37	0.61*	0.50	3.41
Presence of walking amenities	−0.51	0.31	0.59	−0.53	0.35	0.58
View of landscape features	.08	0.14	1.08	0.61*	0.37	3.51
Presence of natural features	−9.43	20096	0.00	−8.79	20096	0.00
Presence of public spaces	−0.59	0.35	0.55	−0.05	0.38	0.94
Presence of facilities	−0.14	0.19	.866	−0.10	0.21	0.89
Connection to offsite destinations	−20.60	25588	0.00	−19.15	27212	0.00
Path type	0.12	0.34	1.13	0.77	0.39	2.16
Path condition	0.96	0.86	2.61	0.42	0.88	1.53
Path slope	0.26	0.35	1.29	0.17	0.42	1.18
Model χ^2	28.22*			38.94*		
Model Nagelkerke R^2	0.11			0.31		

Note: The dependent variable in this analysis is path use coded so that 0=not used and 1=used. *$p < 0.05$.

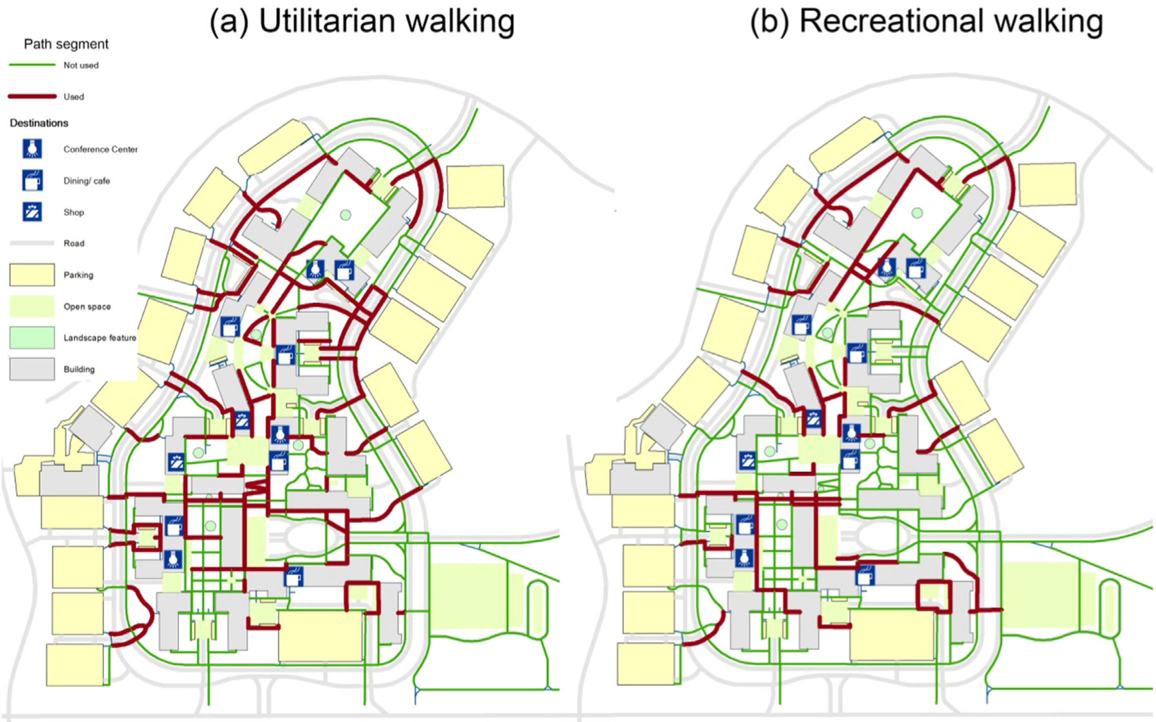

Fig. 4. The path segments used for (a) utilitarian walking and (b) recreational walking. The path segments were categorised into two groups: not used (represented with thin green lines) and used (presented with thick red lines). The outdoor physical activity area on the campus's bottom left corner was designed for recreational walking, but was rarely used. The campus perimeter path segments were seldom used for walking. (For interpretation of the references to color in this figure legend, the reader is referred to the web version of this article.)

environment also support similar conclusion: aesthetic features are positively associated with walking for exercise (Ball et al., 2001). However, measures of aesthetic attribute of the built environment vary across studies (Saelens and Handy, 2008). Aesthetic features can be assessed by the presence or absence of street trees, graffiti, benches, and blind alleyways

(Handy et al., 2002). This study provides some useful additional measures of aesthetic features from a perspective of a corporate campus setting through indicators such as presence of landscape setting on both sides of path, views of landscape features, such as public art, water fountains, trees, and presence of walkway shelter.

The design of street networks that supports campus-to-surrounding continuity has been identified to be essential for supporting walking beyond the campus (Zook et al., 2012). Observational data show walking trips were clumped within the site rather than distributed to its surroundings. It is unlikely that the site is hosting much walking between the campus and its surrounds. It can thus be reasonably inferred that the pattern of use at this campus is similar to that at any traditional, enclosed working environment, with the great majority of employees approaching by car, working in buildings, spending time in common areas, and then departing by car. Although the possibility exists to walk from the campus to surrounding areas beyond it, employees do not realize this potential. Walking behaviours were concentrated on relatively few path segments within the primary campus area, and their presence diminishes beyond the edges of campus site.

There may be one important design feature at play here. Even through there are some shops and restaurants within 10-minute walking distance from the edge of the campus, the wide roads at the south and west of the site presented barriers to pedestrian flow and hindered pedestrian safety.

The findings that certain path segment features were associated with more walking should not be interpreted as a causal effect of the environment. The decision to walk or not is likely to be affected by a wide range of social and intrapersonal factors, such as self-efficacy, social support and knowledge of the benefits of walking (Chaix et al., 2013). However, the decision of which route to take is more likely to be related to path characteristics. For example, this study showed that people engaging in recreational walking more frequently use paths with views and shelters. These findings are relevant to designers, especially by shedding light on specific micro-level design factors. Designers might be able to improve the pleasure and comfort of paths in new campuses or retrofit existing ones based on our evidences and others.

Furthermore, we developed an innovative tool for collecting walking behaviour data at campuses. Our online map-based tool can effectively collect several aspects of walking behaviours including intention to walk, origin, destination, route, time and speed.

The Online Walking Journal has both advantages and limits compared with GPS. The developed tool can collect information on intention to walk which cannot be assessed by GPS, through the later can objectively collect locational data. Furthermore, the Online Walking Journal has a lower participant burden. The lower burden may explain the low likelihood of data loss with the Online Walking Journal. There was a strong positive relationship between the number of days of participation and the likelihood of data loss. In this study, the final data loss after five consecutive days was 35%. A similar pattern was found in a meta-review of 24 studies that used GPS data to study the relationship between physical activity and environment (Krenn et al., 2011). GPS data loss after six consecutive days was as high as 52%. In contrast, sample size, age group, device manufacturer and the use of incentives for participants did not appear to be related to GPS data quality (Krenn et al., 2011; Voss et al., 2014). Despite its relative success, retaining participants still remained important in the Online Walking Journal tool. The possible solutions include shortening participation days or sending reminders one or two days into a study.

Among the limits, a small sample size impedes generalizability of the current findings. Reliance only one corporate campus as our case study implies homogeneity of the environmental exposure. Stemming from our present pilot, we plan to address this issue through a large-scale study of multiple campuses with differential environmental features. Our Online Walking Journal relied on a campus map and photo images of buildings and path segments to help the study participants orient themselves. A few participants had expressed problems with identifying buildings and locations using the birds-eye Online Walking Journal map. This can be made more user-friendly adding a simple online training module in future. Furthermore, future studies should endeavour to enhance the objectivity by employing smart technologies. For example, GPS trace data of individual trips and objective accelerometer-based physical activity data can not only act as a powerful validation tool for Online Walking Journal, but also inform about work-related in-campus physical activity.

5. Conclusion

Smart corporate campus design is one of the key attributes of smart and healthy cities of the future. The present study aimed to contribute in this direction, especially through the development of our *remotely administered* Online Walking Journal to assess walking behaviours. Such a tool, we believe, will help identify campus-level design features promoting walking and physical activity. These will in turn help target and retrofit existing walk-hindering campuses.

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