More than Just Exercise: Walking in Today's Cities
Working Paper

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Andrew Mondschein
Rudin Center for Transportation Policy and Management
NYU Robert F. Wagner School of Public Service
295 Lafayette Street
New York NY 10012
andrew.mondschein@nyu.edu

ABSTRACT
Transportation planners, policymakers, urban designers, and activists have expended considerable effort over the past few decades promoting walking as one of several alternatives to driving. More recently, the public health benefit of a physically active population, including a population that walks more often, has become another reason to encourage walking. Amongst all of this excitement about walking, there has so far been little exploration of the role walking plays in people's lives and cities' welfare. One little understood aspect of walking is its appeal beyond simple "derived demand" travel choice frameworks. Though we might intuitively know that people walk for more than just to get from A to B, there's been little to explain what people gain from walking beyond its potential health benefit. An investigation of pedestrian behavior using the 2009 National Household Travel Survey suggests that the reasons that people choose to walk vary considerably across place and class, and that walking in urban areas may best be explained by a dual conceptualization of walking as the mode of last resort and a highly-prized urban amenity. This seemingly self-contradictory dual role suggests that policies that want to encourage walking across a broad swath of the population will need to overcome barriers rooted in everyday lifestyles just as much as in the quality of the built environment.

1. INTRODUCTION

Walking is the original travel mode. Yet while walking remains an essential mode of transport in even the most auto-dominated cities, other modes have taken its place for many everyday trips. Still, transportation planners, policymakers, urban designers, and activists have expended considerable effort over the past few decades promoting walking as one of several alternatives to driving. More recently, the public health benefit of a physically active population, including a population that walks more often, has become another reason to encourage walking. Amongst all of this excitement about walking, there has so far been little exploration of the role walking plays in people's lives and cities' welfare. One little understood aspect of walking is its appeal beyond simple "derived demand" travel choice frameworks. Though we might intuitively know that people walk for more than just to get from A to B, there's been little to explain what people gain from walking beyond its potential health benefit. An investigation of pedestrian behavior using the 2009 National Household Travel Survey suggests that the reasons that people choose to walk vary considerably across place and social class, and that walking in urban areas may best be explained by a dual conceptualization of walking as the mode of last resort and as a lifestyle choice. This seemingly self-contradictory dual role suggests that policies that want to encourage walking across a broad swath of the population will need to overcome barriers rooted in everyday activity patterns as much as in the quality of the built environment. Policies should include those that help individuals break out of the constraints of their routines.

This research seeks to understand how pedestrian behavior manifests within contemporary cities, and the behavioral reasons why people do and do not walk. A conceptual review sets walking within a framework that highlights its roles both as the lowest-cost mode and its appeal within an amenity-based theory of urban agglomeration. From these theories, a lifestyle-driven hypothesis of pedestrianism is developed. Following this review, the use of the 2009 National Household Travel Survey (NHTS) to understand the role of lifestyle in explaining walking behavior is described. Analysis and key results are then presented. Of particular note is the fact that, while density is a necessary component for increased walking, social class and education are also significant correlates with walking and social walking in particular. However, walking by high-status individuals does not necessarily result in reduced VMT. The implications of these findings are explored, with discussion of potential policies to increase walking and directions for future research.

2. CONCEPTUAL REVIEW

While transportation researchers have approached walking from numerous avenues of inquiry, how walking functions on a more fundamental, behavioral level has only been infrequently addressed. Yet broader theories of human travel and activity behavior, whether economic or psychological in origin, do shed light on why people choose to walk rather than utilize another mode. These theories suggest a framework for understanding urban pedestrianism.

2.1 Pedestrians and Walking in Transportation Literature

Within transportation research, walking is – understandably – treated first and foremost as a safety and circulation issue *(1-3)*. This literature emphasizes management of the conflicts between the many modes deployed in contemporary cities. Beyond safety and circulation, however, researchers have focused on encouraging walking as an alternative to driving for its environmental benefits, and more recently, for the potential health benefits of "active travel." This emphasis on urban form and health, however, may have bypassed potentially more

thorough treatments of the role of walking in cities beyond its particular environmental and salutary benefits.

2.1.1 Encouraging walking through design of the built environment

In recent decades, transportation researchers have sought not just to make walking safe but to understand what might encourage more of it in urban environments. The motivation to encourage increased walking has typically been walking's environmental benefits, as a replacement along with biking or transit for travel by private car *(4)*. Regardless of motivation, changes to the built environment have traditionally been seen as the primary means to increase walking, whether through land use planning (e.g. denser, mixed use neighborhoods), road design (more sidewalks and intersecting streets), urban design (more appealing walking environments), or otherwise (safe routes to school) *(5-7)*. As with any large body of literature, findings as to whether the built environment can effectively encourage walking is mixed, though the empirical evidence at least demonstrates a strong correlation between dense, mixed-use neighborhoods and increased walking *(8)*. Regardless, this body of literature generally envisions walking as a substitute for more energy-intensive, polluting modes such as driving.

2.1.2 Health benefits of active travel

In the past decade or so, transportation researchers, as well as many public health researchers, have come to see increased walking as a means to community-wide health benefits *(9, 10)*. The research in this area tends to operate along the same lines as parallel research that encourages walking for its environmental benefits. Most studies seek to understand the causal relationship between active travel and the built environment. However, in the case of this literature, the goal is particularly focused: getting people's heart rates up *(11)*.

2.2 Theories of Why We Walk

While most people would be happy to partake in the environmental and health benefits that walking can provide, such benefits are likely subordinated by most to considerations of economic and personal well-being. Thus, theories that step back from the promotion of walking to achieve a particular policy goal and that seek to understand the fundamental role or roles of walking in people's lives are likely to – in the long run – assist with the development of more targeted and effective policies to increase walking.

2.2.1 The microeconomic perspective

Boarnet and Crane, among others, address the basic microeconomic explanation for why people may choose one mode over another to reach a particular activity *(8)*. Positing that travel is a derived demand, the choice to use one mode over another is based on modes' relative costs in terms of both time and money. Walking is certainly very slow relative to other modes. However, it is also relatively free of upfront or ongoing costs. One would expect people with little money and/or lots of time to favor walking, and the literature bears this out. Immigrants, in particular, are more likely to walk relative to other groups, as are the young *(12, 13)*. Further, this demand-based theory also explains why walking is more likely to occur in dense neighborhoods, where walking is more competitive in terms of time costs, relative to other modes.

2.2.2 Walking as an amenity and socio-economic imperative

Within the urban economic literature, amenities are posited as one explanation for urban agglomeration *(14, 15)*. Amenities can include natural and man-made place features, from good weather to good restaurants. Glaeser et al. suggest that contemporary cities are "centers of consumption," and high densities of amenities lead to faster growth rates *(16)*. Further, density is correlated with consumer amenities *(17)*. Thus, dense, high-amenity cities are attractive to households and individuals, at least to those who can afford them.

Economic geographers have reinforced the value of face-to-face contacts in economic activity, particularly in sectors where innovation is a priority *(18, 19)*. As the literature makes clear, face-to-face contacts are more than just a means of conducting meetings and entering into contracts, as important as those acts may be. Face-to-face contact also enables economic participants to assess competitors, display one's strengths, and reinforce network ties. In industries with many participants, whether creative, professional, or managerial, the best way to assess competitors, display oneself, and reinforce ties may be to be present in a public place where many similar participants can be found. In cities, that place is "the street," and the only way to fully participate is to get out and walk. Such imperatives hold even more strongly for social interactions, where "to see and be seen" is an essential component of human behavior *(20)*.

Beyond social and economic imperatives for being on the street and walking, human psychology may drive urban walking, in that the act of wayfinding enables walkers to develop a richer, more robust relationship with their surroundings. Researchers have found that wayfinding puts people in a particularly "aware" mental state, where their surroundings are more vivid and memorable *(21, 22)*. Particularly in urban areas, walking has been found to powerful, emotionally charged experience *(23)*.

2.3 The Dual Roles of Pedestrianism

2.3.1 Two Models of Walking

Is walking more prevalent in cities merely because it is more competitive with other modes in dense environments? Or is walking more than a means of getting from A to B in such places? The answer appears to be: both. Yes, walking serves as a mode of last resort, when a person has limited cash and little access to other modes. However, it also is a part of the lives of those individuals who can take advantage of walking's distinctive rewards. The rewards of walking can be defined in terms of the economic and psychological theories cited above.

Many urban amenities, whether climate, street life, or the urban fabric itself, can only be "consumed" by being present among them. Walking, and the way it affords a personal, vivid relationship with a place, thus provides a way to "consume" those amenities *(24)*. Further, economic geographers have suggested the importance of physical presence in economic relationships. It is not too far to extend from concept of "face-to-face" to "see and be seen." Here again, walking is likely to play an important role in such interactions as the mode that provides the most exposure and observational advantage, particularly for individuals in economic sectors where there are many, diverse independent participants with whom to interact. Findings from environmental psychology reinforce the importance of walking in a "consumer city" such as that described by Glaeser. Wayfinding is a psychologically powerful act, enabling people to garner not just information but also attachment and emotion from the surrounding environment. Thus, for at least some urban dwellers, walking would be a potentially psychologically, socially, and economically rewarding act.

These two models of walking can be termed (a) "walking as necessity" and (b) "walking as lifestyle." Both models are applicable to contemporary cities, but not necessarily to the same populations within a single city. In fact, by many socio-economic measures, the populations that might walk more than average would likely have little in common. The "walking as necessity" model would apply to populations with little access to money or the information needed in order to make use of other modes or far-away destinations. The "walking as lifestyle" model would apply to a population that has the luxury of time and belongs to a class that would be most likely to benefit – economically and socially – from the interactions with people and places availed by walking.

2.3.2 Hypotheses

The dual model conceptualization of walking should result in the observation of two very different populations engaging in relatively high levels walking in contemporary cities. Despite the shared characteristic of substantial walking, these two populations should exhibit empirically distinct differences in the purposes and patterns of their pedestrian behavior. The following differences ought to be observable between the populations:

- **Socio-economic differences**: One population would be comprised of the least well off in society, while the other would be comprised of the urban "elite," defined by a broad range of socio-economic traits.
- **Trip purpose differences: T**he types of walk trips engaged in by "necessity" and "lifestyle" pedestrians should be markedly different in purpose. Where necessity pedestrians would tend to use walking at the same rate for all local trips, lifestyle pedestrians are likely to use walking more selectively, for social and consumption trips, but not relying on walking for errands and other obligatory trips.
- **Lifestyle walking a complement, not substitute for other travel:** "Walking as a lifestyle" is unlikely to be associated with overall reductions in VMT, as walk trips would be complementary to wide-ranging travel to take advantage of urban amenities and economic opportunities.

In addition:

- **Model of travel behavior distinctive to walking:** Conceptually, the dual models are only applicable to walking. The observed patterns should be distinctive to walking behavior, and not observed among other non-driving modes such as transit and cycling.

3. DATA

3.1 2009 National Household Travel Survey

To test the above hypotheses, a dataset with detailed information on individual trips, trip purposes, and a thorough accounting of travelers' socio-economic characteristics would be required. The 2009 National Household Travel Survey (NHTS) supplies such information, including the trips and activities undertaken by a weighted sample of the United States population on a single travel day *(25)*. Because of the NHTS's large total sample size (N>308,000 persons), focused investigations of trip purposes and mode, even when limited to a particular demographic group or locale, are generally availed of a useful sample size for statistical analysis. Because the sample is national in scope, it allows for comparisons among regions as a whole.

The strengths of the NHTS lie in its very large sample size, the detailed nature of its trip classifications, and the wide variety of socio-economic data associated with each person and household. However, use of the NHTS also presents some challenges for exploring the concepts put forward in this research. Foremost, while the length of each trip on the survey day is included, the geographic locations of origins and destinations are not, making the inclusion of neighborhood characteristics in the analysis very difficult. While residential and activity locations are not available, residential population and housing densities are available for each person in the survey.

For the purposes of this investigation, the sample was constrained to adults (>17 years) living in urban parts of the United States as defined by the US Census Bureau. While the walking behavior of those younger than 18 is certainly an important component of walking policy (e.g. Safe Routes to School), the lifestyle conceptualization of walking would not be appropriate for young persons. The result is a total possible sample size of 184,807 persons, representing a population of more than 175 million urban adults.

3.2 The Geography and Walking and Density in the US

As the literature on walking and the built environment makes clear, density is correlated with walking. In order to focus on the behaviors of individuals for whom walking is a part of everyday life, the analysis differentiates between people living in higher and lower density parts of metropolitan areas. The density break point of 10,000 persons per square mile was chosen to be inclusive of a variety of locales throughout the US. (In the NHTS, density refers to the survey respondent's residential location, rather than density at trip destinations.) Not just the major Eastern cities include substantial areas above 10,000 persons per square mile. Midwestern and Western cities such as Chicago, Los Angeles, and Portland also do, as well as central neighborhoods in cities like Miami, Dallas, Milwaukee, and Seattle *(26)*. In all, the NHTS reports 29 million people live in neighborhoods with more than 10,000 persons per square mile nationwide, roughly 10% of the total US population *(25)*.

TABLE 1 Walking and Density in US Regions

Walk Trips as Percent of Total Trips						
Entire Region[1]				Region >10,000 Persons per Sqmi[2]		
1	New York, NY--NJ--CT—PA	22.0%		1	Atlanta, GA	64.9%
2	Chicago, IL--IN—WI	16.7%		2	Detroit, MI	64.8%
3	Portland, OR—WA	15.9%		3	Chicago, IL--IN—WI	36.1%
4	Washington, DC--MD--VA—WV	14.6%		4	New York, NY--NJ--CT—PA	33.5%
5	Philadelphia, PA--NJ--DE—MD	14.4%		5	Seattle, WA	32.1%
6	Boston, MA--NH--ME—CT	14.4%		6	Portland, OR—WA	28.2%
7	San Francisco, CA	14.2%		7	Washington, DC--MD--VA—WV	27.8%
8	Los Angeles, CA	12.9%		8	Boston, MA--NH--ME—CT	27.3%
9	Seattle, WA	12.6%		9	Rochester, NY	26.6%
10	Providence, RI—MA	12.4%		10	Pittsburgh, PA	24.1%

1 – Combined Metropolitan Statistical Areas defined by US Census
2 – Walking Rate for Those Living in Census Tracts with >10,000 Persons per Sqmi

Table 1 ranks US regions by the prevalence of walking trips. As the table shows, the top ten regions for walking overall are not the same, nor in the same order, as the top regions for walking when only considering those living in neighborhoods denser than 10,000 persons per

square mile. Notably, people who live in denser areas of regions that by and large are lower density, such as Atlanta or Detroit, are particularly reliant on walking, whether due to socio-economic status, a lack of access to modes beyond walking and driving, or a combination of those two factors.

4. ANALYSIS

4.1 The Difference between Lifestyle and Necessity Walkers

A central hypothesis of this research is that two distinctly different socio-economic groups will be observed to have high rates of walking, one group being "necessity" walkers and the other being "lifestyle" walkers. To test the hypothesis, an empirical definition must be made for the two groups. Many socio-economic variables available in the 2009 NHTS could be used to characterize individuals' and households' resource availability, access to private vehicles, and participation in a high-amenity lifestyle. Variables include car ownership, home ownership, occupation, time flexibility, as well as race/ethnicity, immigration status, gender, and age. Income and education, however, stand out because they are measurable along a continuous scale. A continuous scale measuring status would be more advantageous for observing two separate groups within the overall population, each with high levels of walking.

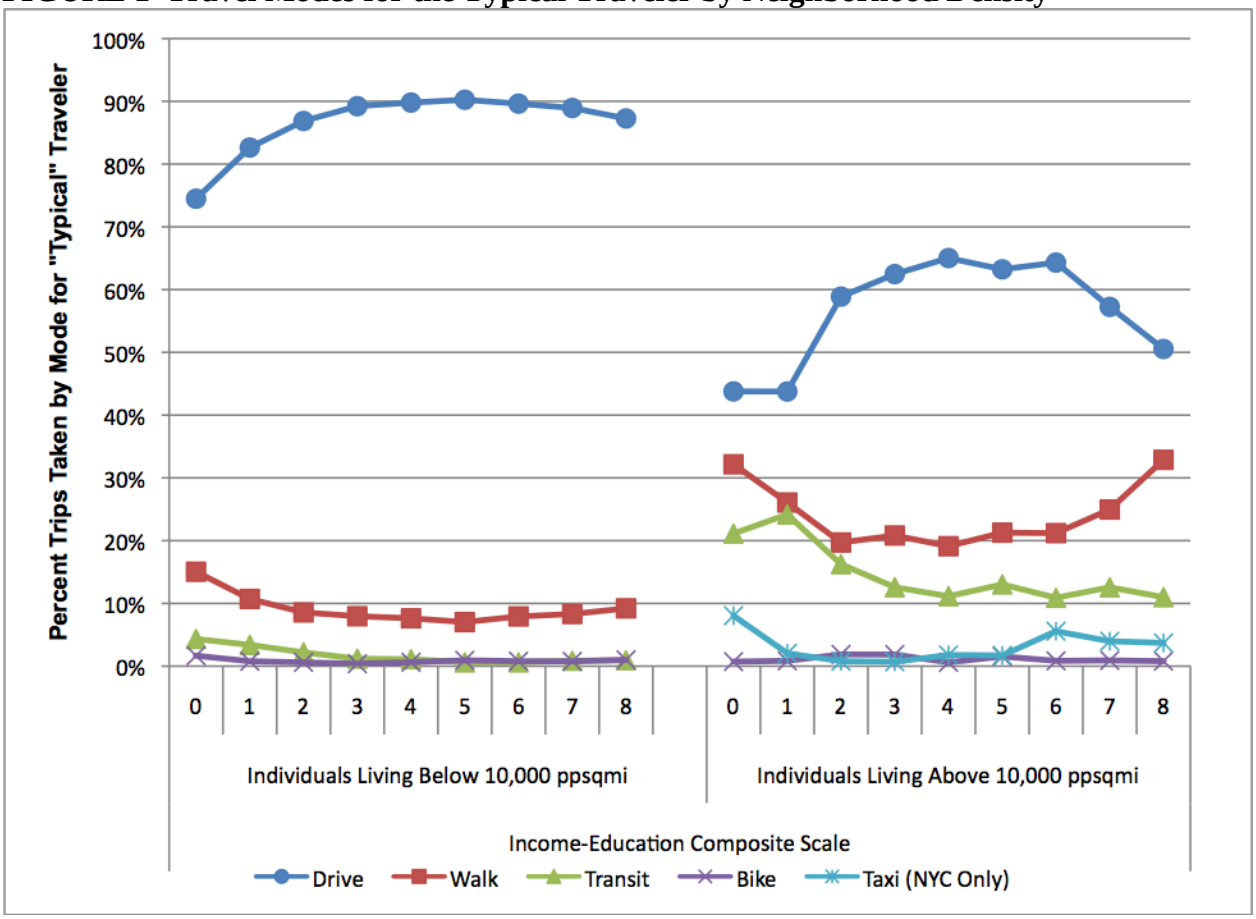
A continuous composite scale, combining education and household income, was developed in order to measure the overall socio-economic status of urban residents. The scale weights income and education equally (using scales for each as defined in the NHTS), and runs from 0 to 8. This income-education scale is positively correlated many "lifestyle" variables included in the NHTS, including:

- Home ownership
- Car ownership
- Work start-time flexibility
- Occupation categories:
  - Manufacturing/construction (low)
  - Clerical/admin/sales/service (middle)
  - Professional/managerial/technical (high)
- Internet use

Figure 1 illustrates the relationship between the income-education scale and travel by major transportation modes. The population has been split into individuals living in neighborhoods above and below 10,000 persons per square mile. Mode is represented by its percentage share of all trips taken by an average individual within each category of interest. The role of density in choice of travel mode is evident, with auto travel being far more dominant relative to other modes for the low density population. However, there is also a great deal of variation in the modes travelers use depending on socio-economic status. Particularly for high density areas, walking shows a very distinct pattern where individuals at either extreme of the income-education scale choose to walk over 50% more often than those in the middle. Notably, this pattern is not replicated among the other "alternative modes." Transit use generally declines with the increase in socio-economic status, and bike travel is flat. Taxi trips are included only for very high density areas (>25,000 persons per square mile) in the New York area, roughly equivalent to Manhattan. There, a potentially similar pattern to walking may exist for taxis, though at a much lower mode share. For low density areas, an increase in walk trips as the

income-education scale rises from middle- to high-status is observable, but not to the same degree as in high density areas.

FIGURE 1 Travel Modes for the Typical Traveler by Neighborhood Density

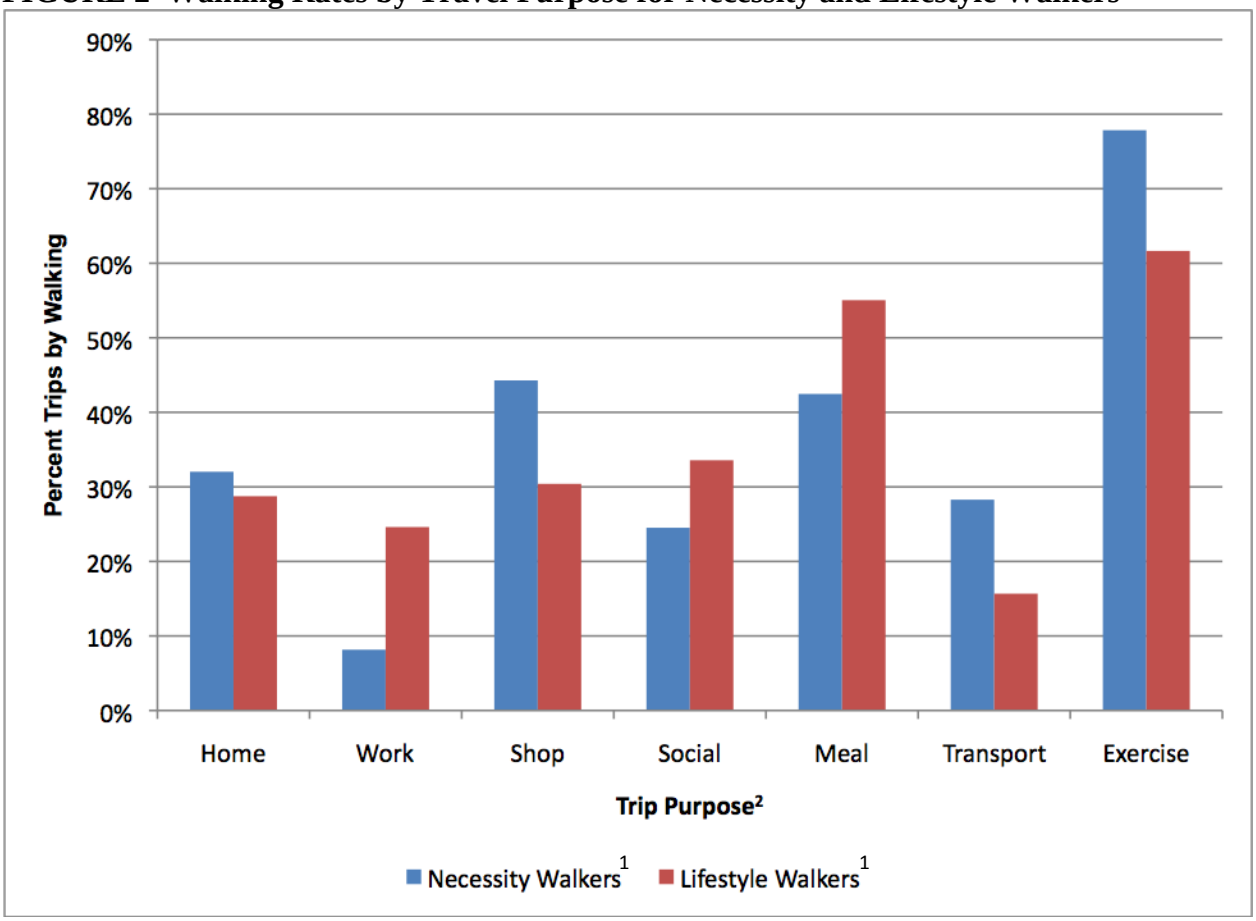


Only walking, particularly in high density areas, increases towards both extremes of the socio-economic spectrum, primarily taking mode share from driving. Note that these patterns hold when controlling for a wide variety of demographic variables, including race/ethnicity and gender. The patterns also hold whether New York is included or excluded from the sample.

4.2 Trip Purpose

While necessity and lifestyle walkers may walk at roughly equivalent rates, they may not be walking for the same reasons. Lifestyle walkers would be expected to walk to engage in social and consumption-oriented activities like meeting friends, eating meals, and retail shopping, but still use other, potentially quicker modes to accomplish activities such as errands and transport of others. Figure 2 illustrates how walking rates vary among trip purposes, for those at the far ends of the income-education scale: necessity and lifestyle walkers. The analysis is limited to those living in high density areas (>10,000 persons per square mile). Trip purposes are summary categories drawn from the NHTS, with the exception of the "exercise" trip purpose, which is a detail category within the larger social/recreational category.

FIGURE 2 Walking Rates by Travel Purpose for Necessity and Lifestyle Walkers



1-Neccesity walkers are those in the lowest category of the income-education scale; lifestyle walkers are in the highest.
2-Work=work or work-related; shop=shopping or errands; social=social/recreational excluding exercise; transport=picking up or dropping off

Home trips are comprised of return trips made after completing one activity or an activity chain, so the walking rate for home trips is unsurprisingly similar to the walking rate for all trips (as shown in Figure 1). The other trip purpose categories do demonstrate differences between the necessity and lifestyle walkers. Lifestyle walkers do tend to walk more for social purposes, as well as for eating out. Surprisingly, they also walk substantially more for work trips. This could be explained by the fact that lifestyle walkers may have self-selected residential locations that are close to their offices. In contrast, necessity walkers walk relatively more for shopping, transporting others, and exercise. The shopping category is challenging to interpret, in that it includes everyday errands such as groceries and the bank, but also more infrequent but expensive trips such as clothes. However, the bulk of trips are likely errands, and thus not necessarily of great appeal to those at the high-end of the socio-economic scale to walk to. It's notable that while exercise is certainly an important category of walk trip, lifestyle walkers are actually less likely to walk for exercise. This suggests that personal health is not the central motivation for a walking lifestyle.

4.3 Walking: Complement or Substitute for Travel by Other Modes?

Another prediction of the dual model is that for lifestyle walkers, walk trips are not necessarily substitutes for trips by other modes. For them, the choice to walk does not rule out long trips, whether by car or transit, to access additional opportunities far from home or work. For those at the low end of the socio-economic scale, on the other hand, the walk trip is a substitute for trips by another, less affordable mode. Table 2 presents mean and median total mileage traveled on a typical day, as well as total number of trips, for adults in low and high density areas, grouped by the income-education scale.

TABLE 2 Total Travel by Socio-Economic Status

	Low Density Areas (<10,000 ppsqmi)			High Density Areas (>10,000 ppsqmi)		
Income-Education Scale	Mean Daily Travel (miles)	Median Daily Travel (miles)	Mean Daily Trips	Mean Daily Travel (miles)	Median Daily Travel (miles)	Mean Daily Trips
0	24.4	10.0	3.70	13.6	4.0	3.76
1	32.7	15.2	4.13	21.4	8.3	3.84
2	32.2	20.0	4.36	21.8	12.0	4.05
3	37.7	22.0	4.54	27.7	14.0	4.20
4	38.5	22.3	4.59	32.1	16.0	4.65
5	49.5	27.0	4.69	35.5	16.0	4.57
6	53.3	28.0	4.94	35.9	16.3	5.08
7	58.8	30.8	5.14	39.5	17.4	4.98
8	58.6	30.0	5.18	38.7	13.0	5.23

The table shows that despite walking far more on average than those at the middle of the income-education scale, lifestyle walkers still manage to cover more mileage on a typical day (and make more trips) than those in the middle of the scale, and far more than those at the low end of the scale. This suggests that, for lifestyle walkers, walk trips are complements to other travel. Whether the non-walking trips are by transit, private vehicle, or other mode would determine how many additional vehicle miles traveled (VMT) are produced. Nevertheless, the table suggests that the choice to walk, for those of means, does not guarantee lower VMT. Still, at the very high end of the scale, total daily travel mileage does flatten, or even reduce somewhat. Note that the patterns in Table 2 hold, even when a subset of the walking population is used that relies on walking for at least half of all trips. Even then, those at the high end of the income-education scale travel much farther than those at the low end.

5. CONCLUSIONS

5.1 Policy Implications

The conceptual framework and the results of the analysis can help planners and policymakers evaluate current policies to increase walking and develop new policies that are cognizant of the complex nature of pedestrianism in contemporary cities.

5.1.1 Built Environment

The effort to increase walking has largely focused on modifying the built environment, whether through more dense development or increasing the attractiveness of the existing streetscape.

Certainly, this analysis reinforces findings that walking is usually positively correlated with density. What this analysis adds is that, if much of the increase in walking is due to individuals at the high-end of the socio-economic spectrum, then many of the new walk trips may not replace travel by other modes, but merely complement that travel. Thus, built environment strategies may be less successful in reducing VMT than would otherwise be expected.

5.1.2 Raising the Price of Auto Travel

The analysis shows that the socio-economic "middle" walks the least, given a particular urban density. In the logic of the conceptual framework, individuals in the middle of the socio-economic spectrum don't have the time, resources or flexibility to take advantage of the amenities that walking provides, but they do have enough money to travel by car or transit. When transportation researchers or policymakers propose raising the price of car travel, those in the middle become more like the walkers of necessity at the low end of the socio-economic spectrum. This may increase walking rates, but it may also reduce accessibility. The findings show that walkers of necessity don't travel as far, and they make fewer trips overall. Therefore a policy to increase the price of auto travel would likely make that true for the middle of the socio-economic spectrum as well.

5.1.3 Information Technology

Investment in information technologies is not a traditional transportation policy objective, but it may to increase the effectiveness of the transportation system, particularly for a mode like walking. Information is another key component of the choice to travel, along with time and money. While it may be appealing to do as a tourist, the high time costs of exploring while walking make learning about opportunities within walking distance functionally very costly. Urban information technologies, however, short-circuit the need for exploration by providing individuals with information about opportunities within walking distance, whether for meals, shopping, services, or otherwise. Thus, individuals don't need to risk a long, wasted walking trip when seeking to accomplish something nearby. Certainly, these advantages would be applicable to car or transit trips as well, but the relative slowness of walking makes prior knowledge particularly valuable: Circling the block in a car takes a minute; circling the block on foot takes ten. While the private sector is spearheading the dissemination of location-based information technologies, cities can work to encourage the dissemination of such technologies to underserved populations and areas.

5.2 Directions for Future Research

The analysis presented here is the beginning of a wide ranging investigation of pedestrian behavior and its potential benefits to today's cities. Several avenues for improvement and extension of this analysis are available:

- *Refine the models* – The dual model of pedestrianism, particularly the idea of "walking as lifestyle" could best be refined and validated by more directly understanding the decision making processes of those who walk because they wish to. A survey that addressed attitudes towards walking and the types of amenities that encourage walking would help accomplish that goal.
- *Incorporate the geography of walking* – The NHTS does not include the locations of trip origins and destinations. How walking trips are distributed throughout the

today's vast urban regions is important to understand, particularly in the "walking as an amenity" context.

- *Economic impact of lifestyle walking* – Walking by high-status urban dwellers supports specific types of businesses, whether restaurants, boutiques, or high-end services. What neighborhood characteristics support a robust local economy based on foot traffic? Can these patterns be replicated?

5.3 Not Just For Exercise

The choice to walk is not the same for all segments of society. For those with few resources, walking is a travel choice of necessity. For those with tremendous resources, walking may be an essential component of a particular urban lifestyle. Lifestyle walking explains the significantly higher levels of walking by high-status individuals, putting walking at the center of a lifestyle that prizes urban amenities and relies on face-to-face contact for social and economic success. This type of walking may not directly result in VMT reductions or increased public health, but it may help explain why neighborhoods like SoHo in New York, South Beach in Miami, Lincoln Park in Chicago, or any number of other great walking neighborhoods nationwide persist and thrive.

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