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Automobile dependence and physical inactivity: Insights from the California Household Travel Survey

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ABSTRACT

Background: Auto-dependence has been linked to the physical inactivity epidemic across U.S. cities, resulting in unprecedented increases in incidences of obesity, cardiovascular diseases, depression, etc. The search for strategies to pull an overwhelming majority of auto-dependents out of their sedentary lifestyles by encouraging them to use transit, walk and bike continues to challenge planners and policy-makers.

Methods: We use the 2012–13 California Household Travel Survey data for analyzing the auto-dependence and physical inactivity connection. We select a sample of employed individuals with access to car in urban California, and classify them as *discretionary transit riders* (N = 390), *active auto-dependents* (N = 1287), or *sedentary auto-dependents* (N = 8754) based on their self-reported travel mode use and time spent in physical activity over a 24-h period. We investigate factors that are associated with significantly high physical activity among some auto-dependents relative to the sedentary majority. We also revisit the transit-physical activity connection, and explore conditions that make transit use unfeasible for some active auto-dependents.

Results: Discretionary transit use is associated with higher physical activity. However, there is large variation in physical activity within auto-dependents; significantly higher physical activity is associated with factors such as higher income, flexible work schedule, shorter work hours, and mixed land use. Kids, inflexibility of work schedule, low residential density, lack of pedestrian and bicycling friendly street design, and long distance to transit stops prohibit otherwise active auto-dependents from choosing transit. Employment sector influences both physical activity and choice of transit.

Conclusion: To get sedentary auto-dependents out of endemic physical inactivity, our research indicates the need for targeting lower-incomes, incentivizing employers to provide flexible work hours, and to continue dense, mixed-use developments that make active travel feasible. In addition, to get active auto-dependents to use transit, transit managers must focus on retaining immigrant riders and non-Hispanic Asians, and attracting people with children.

1. Introduction

Survey data shows that the U.S. has one of the highest rates of vehicle ownership and use in the world (Dargay et al., 2007; Schipper, 2011). The latest nationwide travel survey (National Household Travel Survey, NHTS-2009) estimates show, on average, that there are 1.9 vehicles per U.S. household, and that over 83% of all trips are made by the private automobile (Santos et al., 2011).

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Recent American Community Survey (ACS-2014, 1-year estimates) data shows that about 90% of the U.S. workforce use a car, truck or van to get to work. These rates have remained largely unchanged over the past two decades, and consequently the search for more effective plans and policies aimed at reversing auto-orientation and consequently reducing travel-related greenhouse gas (GHG) emissions, enhancing public health, and improving traffic conditions must continue.

Public health consequences (e.g. chronic illnesses or premature death due to exposure to air or noise pollution and inadequate physical activity, and the risk of traffic accidents) of auto-dependence and auto-oriented development patterns have been studied extensively, necessitating the incorporation of public health and overall quality of life objectives into transportation decision-making (Farhang and Bhatia, 2005; Litman, 2013; Dannenberg and Sener, 2015; Lee and Sener, 2016). Particularly, exploration of the relationship between land use, transportation and physical (in)activity has become increasingly relevant due to rising obesity, cardiovascular diseases, diabetes, etc. across urban populations – attributable, in part, to sedentary urban lifestyles (Kohl et al., 2012). If coordinated land use and transport policy can help increase physical activity by encouraging use of alternative, more “active,” travel modes (by getting people out of their cars and to use their feet – walk and bike/bicycle), the effect on public health (Götschi et al., 2015; Schoeppe et al., 2015) is expected to be positive, all else equal.

Public transit use has indisputably been associated with positive physical activity outcomes when compared with auto travel. Since walking and biking cannot compete with the auto mode for all trip types, particularly given existing U.S. urban structures where origins and destinations are not close enough for most trips to be completed via non-motorized travel modes exclusively, the auto vs. transit comparison is useful. The transit – physical activity connection, obviously, operates via active travel modes. Studies have shown, for example, that on average: 1) transit users engage in more physical activity, in terms of both intensity (i.e. energy expended, sometimes estimated from accelerometer measurements) and time (i.e. time spent in moderate-intensity or higher physical activity), compared to auto-dependents, 2) transit users are highly likely to meet recommended levels of daily physical activity (e.g. more than 30 min of physical activity daily), 3) just walking to and from transit can help people attain the recommended daily physical activity level, and 4) transit-induced walking can lead to significant reductions in obesity and associated illnesses such as cardiovascular diseases and diabetes (e.g. see Besser and Dannenberg, 2005; Edwards, 2008; Lachapelle and Frank, 2009; Lachapelle et al., 2011; Lachapelle and Noland, 2012; Rissel et al., 2012; Freeland et al., 2013; Wasfi et al., 2013). Therefore, transit, particularly good quality transit such as light rail that potentially attracts riders, can be considered as one of many tools to increase physical activity and consequently promote good health of U.S. urban residents (Kahn et al., 2002; King et al., 2002; Pendola and Gen, 2007; MacDonald et al., 2010; Saelens et al., 2014; Miller et al., 2015; Durand et al., 2016).

The higher transit use – higher physical activity association is straightforward, but the takeaway for public policy is unclear. On one hand, transit use necessitates additional access and egress trips to and from transit; all or some of these additional trips require non-motorized, or active, travel. Also, most people who do not have access to a car use transit for longer-distance travel; they also need to walk and bike for short-distance trips. Many discretionary (or choice-) riders may select transit to maintain (or as part of) a healthy lifestyle; they may also walk or bike for other purposes and exercise more for achieving their health goals. And individuals with obesity or other disabilities may be unable to use transit because it requires physical activity in the first place. The transit-physical activity connection, in fact, goes beyond transit-related active travel, because we know that transit accessible neighborhoods are associated with environments that are fundamentally favorable to walking and biking for a variety of trip purposes (Cervero and Kockelman, 1997). Auto travel, on the other hand, is faster on average (e.g. the authors’ analysis shows that auto travel is about four times faster than transit travel in the Los Angeles region), and the saved time (which people value; see, e.g., Abrantes and Wardman, 2011) can potentially be utilized productively to engage in outdoor or indoor recreations that can also contribute to physical activity. Moreover, some factors that promote transit ridership, such as proximity to transit stop, may even be at odds with physical activity.

Nonetheless, nationwide travel surveys (e.g. NHTS) and census (or ACS) data (as well as past studies) show that an overwhelming majority of U.S. households own a car, and majority of those who have a car do not use public transit. Moreover, majority of auto-dependents fail to meet recommended physical activity requirements as suggested by our research and many previous studies. Therefore, the argument that moving some car-dependents to discretionary transit users can help promote physical activity level of urban residents on the aggregate, among other things and all else equal, is reasonable. The public health responsibility of transport policy is therefore undeniably significant.

While urban planners continue to experiment with innovative land use – transport based strategies to get more auto-dependents to use some public transit, we provide additional transit-unrelated yet complimentary planning-policy insights for achieving our concerted goal of increasing physical activity of the U.S. urban population more effectively. Specifically, we focus on exploring alternative approaches to increasing physical activity among highly inactive (or sedentary) auto-dependents by analyzing the characteristics of relatively and significantly active auto-dependents. We also examine factors that prevent entry of otherwise active individuals into the discretionary transit travel market. Our research adds to the broader literature of evidence-based public health interventions and programs to address the urban inactivity epidemic, particularly rampant within auto-dependents (Bauman et al., 2012; Heath et al., 2012).

In this paper, we present findings from our analysis of mode use and daily physical activity of employed residents of urban California who have access to car using the recent 2012–13 California Household Travel Survey data. We find that: 1) consistent with prior research, discretionary transit use is indeed associated with higher physical activity, and 2) there are certain personal, household, occupational, and land use factors that allow some auto-dependents to lead significantly active lives if they choose to, and there are some other factors that act as barriers to their choice of transit. Ideas to increase physical activity of the large group of sedentary auto-dependents, and to promote transit use among active auto-dependents are discussed.

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