

Contents lists available at [ScienceDirect](https://www.sciencedirect.com)

Journal of Transport & Health

journal homepage: www.elsevier.com/locate/jth

Examining influences on active travel by sex among college students



Dangaia Sims, Melissa Bopp*, Oliver W.A. Wilson

Department of Kinesiology, The Pennsylvania State University, 266 Recreation Building, University Park, PA 16802, USA

ARTICLE INFO

Keywords:

Active travel
Sex
College students
Social ecological model

ABSTRACT

Active travel (AT) is associated with various health benefits and may be advantageous in preventing the decline in physical activity during college years. Differences in factors related to AT by sex are not well understood.

Objective: To examine factors related to AT by sex among college students.

Participants: Participants included students at a large northeastern United States university (n = 782).

Methods: Students completed an online survey in September 2012 regarding multiple factors related to AT. Multiple logistic regression analyses were used to assess the association of factors related to AT by sex.

Results: Men were more likely to use AT than women. Among men, distance to campus had a significant negative association, and living with a roommate that walked or biked to campus had a significant positive association with AT. Among women, significant negative associations with AT were found for distance to campus and terrain.

Conclusions: Findings from the present study suggest that among college students AT was higher among men than women. Targeting women over men for PA and AT interventions in a university setting may be warranted. Identifying populations at risk for physical inactivity may be useful in developing and implementing tailored multi-factor interventions.

Physical inactivity is a growing public health problem. Among Western countries, physical inactivity ranks second, behind smoking, as a leading modifiable risk factor for morbidity and mortality (Lee et al., 2012; Physical Activity Guidelines Advisory Committee, 2008). Preventable non-communicable diseases are associated with substantial direct and indirect costs estimated at more than \$1 trillion for the general population in 2003. For obesity alone, direct costs were estimated to be \$75 billion in 2003 (Chenoweth and Leutzinger, 2006). Studies have documented that physical activity (PA) aids in the prevention of obesity, cardiometabolic disorders, mental health disorders, certain cancers, and all-cause-mortality (Ahmed et al., 2012; Bassuk and Manson, 2010; Hopper et al., 2011; Knowler et al., 2002; Physical Activity Guidelines Advisory Committee, 2008; Worrall-Carter et al., 2011). Less than half of Americans engage in the recommended levels of PA despite the well-documented and widespread evidence of the benefits of PA (Centers for Disease Control and Prevention, 2016).

Passive travel options are sedentary by nature (e.g., sitting while driving), while active travel (AT) is an alternate means of transport that emphasizes PA (e.g., walking and bicycling) and has been associated with environmental and economic benefits and positive health outcomes (BLINDED 4; Hamer and Chida, 2008; Panter et al., 2011; Rails to Trails Conservancy, 2008; Shephard, 2008; Sugiyama et al., 2010). AT rates in the United States remain low, especially in comparison to other countries (Bassett et al.,

* Corresponding author.

E-mail address: mjb73@psu.edu (M. Bopp).

2008; BLINDED 5; Hu and Reuscher, 2004; Whitfield et al., 2015). In the US, 9% of trips are taken by walking and only 1% by bicycle. This is in stark contrast to many European countries where up to 45% of trips are taken by walking (Switzerland), 25% by bicycle (Netherlands), and 32% by public transit (Latvia) (Bassett et al., 2008).

AT is associated with multiple factors described in the social ecological model (SEM): intrapersonal, interpersonal, institutional, community, environment and public policy (BLINDED 4; McLeroy et al., 1988; Sallis et al., 2006). In recent years, research has indicated that AT is an approach for increasing population-wide PA at each level of the SEM and reducing and preventing morbidity and mortality from chronic disease (Andersen et al., 2000; Gordon-Larsen et al., 2009; Hamer and Chida, 2008; Shephard, 2008; Vuori et al., 1994). Public health initiatives, like *Safe Routes to School*, *Complete Streets*, and the League of American Bicyclists' *Bicycle Friendly America* have been advocating for promoting and increasing capacity for active travel through the installation of bicycle lanes, sidewalks, and other active travel infrastructure (League of American Bicyclists, 2013; National Center for Safe Routes to School, 2013; Smart Growth America, 2013).

Examining PA trends and the point at which they decline throughout the lifespan are of particular interest. PA participation sharply declines during adolescence and young adulthood, which may progress into adulthood, indicating potential “critical moments” for intervention. Previous research has noted a decline in AT-related behavior; a study by Underwood et al. (2014) noted how individuals perceived bicycling differently from childhood through adolescence and into adulthood. The transition to adulthood is accompanied by increased self-sufficiency and may be an important time for laying the foundation for habits that extend into adulthood. The decline in activity levels with this transition has been well documented: a meta-analysis found a modest decline in PA from adolescence to early adulthood, noting a decline of up to 11 min a day of moderate to vigorous PA (Corder et al., 2017). College students comprise a major portion of this demographic and are accordingly an excellent population for understanding behavior and implementing PA interventions.

Existing research on PA patterns among college students has suggested that nearly half of college students do not partake in any amount of PA. Reports of college students indicate that around 35% engage in regular PA, with slightly higher rates for men (40%) than women (32%) (Keating et al., 2005). Data from 2010 the American College Health Association indicated that approximately 53% of college students did not achieve the recommended amount of moderate and/or vigorous levels of PA (150 min per week of moderate PA, 75 minutes of vigorous PA, or an equivalent combination of the two) (American College Health Association, 2012). While it appears that college students are particularly vulnerable to declines in and low-levels of, PA, few studies have examined the correlates of AT among college students, particularly regarding differences in associated factors by sex. The field of mobility biographies has also addressed this life stage, noting how the transition from secondary school to college is typically associated with a change in travel patterns, and noting that it is an ideal time to instill healthy new behaviors (Müggenburg et al., 2015; Rau and Manton, 2016).

Despite the limited sex-based research among college students, multiple studies have examined trends in AT by sex among children. Among children and adolescents actively commuting to and from school in the United States, boys were more likely to bike than girls (Davison et al., 2008; Pabayo et al., 2012). Further, research by Merom et al. (2006) in Australia analyzing active commuting to school among children found that boys were more likely to actively commute than girls (2006). Leslie et al. (2010) showed that girls were more likely to take the bus, tram, or train to and from school than boys in Australia. Despite these noted differences, in many countries the gender disparity for cycling is minimal or does not exist. Denmark, the Netherlands, Finland, Germany, and Sweden all note that women participate in cycling at similar rates to men, and in more bicycle-friendly cities in the United States (e.g. Davis, CA, Boulder, CO) the gap is much smaller (Garrard et al., 2012). While a vast amount of the literature focuses on the general population and children, Hamer and Chida (2008) and Barengo et al. (2004a) showed differences between sexes in AT benefits. Despite these notable benefits, BLINDED 2 examined factors related to AT among employed American adult women and found overall low rates of AT.

Previous research has noted sex-based differences in AT participation for college students. In a study of 20 students at a southwestern university Sisson et al. (2008) reported that college females walked more than their male counterparts. Winters et al. (2007) examined utilitarian bicycling and found that female students were less likely to cycle for transportation than male students and in a sample of 50 students, Sisson and Tudor-Locke (2008) found no differences in cycling behaviors between sexes. While the rates of AT differ between sexes is well documented, the factors related to AT by sex are not well understood.

College-aged individuals represent an ideal group of people at one of the most opportune times in life to examine PA and intervene. Empirical data regarding differences in AT by sex among adults is limited; this is particularly true of college individuals. Thus, the purpose of this study was to examine the range of correlates of AT to and from campus among college students by sex.

1. Methods

1.1. Setting, population, and recruitment

This was a cross-sectional study conducted during the fall of 2012 using an online electronic survey created using Qualtrics software (Provo, UT). All students at the university were eligible to participate in the study.

Recruitment was conducted at BLINDED, a large university with 45,000 undergraduate and graduate students. The university is located in a small northeastern city of the United States. The survey was advertised via the university's online newspaper, posted flyers, and department listservs. Students were invited to take a survey regarding how they travel to campus. This study was approved by the Institutional Review Board of BLINDED University. All participants completed an electronic informed consent at the beginning of the survey. The university's student population during the year of the study was 68.3% Non-Hispanic White, 53.5% male and

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