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Association between vehicle time during pregnancy and mental health among women of different income groups

Kara E. MacLeod[a,*,1], Lu Shi[b], Donglan Zhang[c], Liwei Chen[b,2], Shin Margaret Chao[d,3]

[a] UCLA Fielding School of Public Health, Department of Health Policy and Management, Department of Community Health Sciences, 650 Charles Young Dr. S., 31-269 CHS Box 951772, Los Angeles, CA 90095-1772, USA
[b] Clemson University, Department of Public Health Sciences, Clemson, SC 29634-0745, USA
[c] University of Georgia College of Public Health, Department of Health Policy and Management, Athens, GA 30602, USA
[d] Department of Public Health Los Angeles County, Maternal, Child, and Adolescent Health Programs, 600 South Commonwealth Ave., Los Angeles, CA 90005, USA

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ABSTRACT

Background: The health and social consequences of longer vehicle commutes have been observed in other studies. This study explores whether daily vehicle time during pregnancy is associated with greater mental health symptoms. As travel behavior can be related to where one can afford to live, we examined this by income groups.

Methods: We utilized a subsample of the 2007 Los Angeles Mommy and Baby study of more than 500 women, a cross-sectional survey with current and retrospective reporting. We modelled mental health symptoms during pregnancy and postpartum stratified by income.

Results: Women in this Los Angeles County study spend an average of 2 hours in daily vehicle travel. We found, controlling for physical inactivity and other stress events, that vehicle time was positively associated with mental health symptoms during pregnancy and postpartum among low income women only.

Conclusions: To our knowledge, this is the first paper to examine the mental health impact of daily vehicle time among pregnant women. From a policy perspective, this study points to what housing affordability, neighborhood accessibility, and workplace policies could mean for pregnant women and their families. Vehicle time is a daily demand that can compete with important health behaviors for pregnant women. The impact on low income women only could reflect other experiences in their lives (e.g. occupation, the lack of neighborhood choice and quality). In addition, there is research to suggest that higher income women can "buy back" some of their time. These are areas for future research.

1. Introduction

Postpartum or postnatal depression (PPD), defined as minor to major depression that can occur within 4 weeks to a year of delivery (Teychenne and York, 2013), is a substantial challenge to women giving birth with a prevalence estimate between 8%-12%

* Corresponding author.
E-mail address: Kara.E.M@gmail.com (K.E. MacLeod).

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in the United States (Le Strat et al., 2011; Vesga-López et al., 2008). The perinatal period is a time when women can experience an increase in stress levels, may be more vulnerable to the onset of depression and other mental health disorders, and may be less aware of these symptoms given hormonal variations and lifestyle changes that are simultaneously occurring (Teychenne and York, 2013; Le Strat et al., 2011; Vesga-López et al., 2008; Hahn-Holbrook et al., 2013). This can result in concurrent and postpartum substance use, poor maternal health care, poor infant bonding, and negative parental behaviors (e.g. nutritional behaviors) which can lead to problems with fetal development (e.g. emotional, cognitive) and other long-term consequences to the child (Teychenne and York, 2013; Le Strat et al., 2011; Vesga-López et al., 2008; Hahn-Holbrook et al., 2013; Ko et al., 2012).

The prevention and management of mental health symptoms during the perinatal period has critical public health implications. Known risk factors for PPD include a prior history with a mental health disorder, young and advanced maternal age, no marital/life partner, lower educational status, lower income, stressful life events, and lack of social support (Le Strat et al., 2011; Vesga-López et al., 2008; Hahn-Holbrook et al., 2013; Ko et al., 2012; O'Hara and Swain, 1996). In addition, there is a small body of literature that has examined the role of physical activity in PPD, including a longitudinal study that found that leisure time physical activity may be protective of postpartum depressive symptoms (Teychenne and York, 2013).

Recently, vehicle commuting has garnered attention as a major source of sedentary behavior that can be associated with less physical activity, obesity, and increased mortality risk (Frank et al., 2004; Hoehner et al., 2012; Jacobson et al., 2011; Lopez-Zetina et al., 2006; Núñez-Córdoba et al., 2013; Pendola and Gen, 2007; Sugiyama et al., 2013; Warren et al., 2010; Zhang et al., 2014). In addition, time spent commuting is an activity that competes with other health-related activities (Christian, 2012; Kunn-Nelen, 2015; Voulgaris et al., 2017). It can also be a stressor that is conceptually different from other types of stressful life events. For example, a small study of rail commuters found that greater commute unpredictability (e.g. consistency, timing) was associated with more stress as measured by cortisol (Evans et al., 2002). Larger studies have also documented that control over commuting and commute time impacts perceived stress and it has been argued that stress-related health problems should be accounted for when analyzing the economic costs of commuting (Gottholmseder et al., 2009). Interestingly, there is conflicting evidence in regards to commute mode and mental health. However, some recent findings suggest that active commuting is associated with lower likelihood of obesity and a mental health disorder and less stress compared to vehicle commuting (Tajalli and Hajbabaie, 2017; Rissel et al., 2014). In a longitudinal study of nearly 18,000 adult commuters, switching from car commute mode to active modes led to improvements of perceived psychological well-being while also controlling for job satisfaction, residence, workplace, and health over time (Martin et al., 2014).

There have been a number of papers that have examined the health and social behavior and stress consequences of vehicle travel among the general population. The primary objective of the present study is to explore whether daily vehicle time during pregnancy is associated with mental health symptoms during pregnancy and post-partum period independent of other risk factors. In the U.S., income, housing prices, and SES is predictive of commute times. As travel behavior can be related to where one can afford to live and accessibility to health care and employment (Zolnik, 2010), we examine the association between vehicle time and mental health symptoms by income groups.

2. Methods

We utilized a random sub-sample of more than 500 women from the 2007 Los Angeles Mommy and Baby (LAMB) study for the analysis. These participants in the subsample answered questions about daily time spent in vehicle travel during their pregnancy. The LAMB study recruited Los Angeles County female residents 4–7 months after delivering a live birth in 2007. This is a cross-sectional survey with a response rate of 36% (Chao et al., 2014). Participants with non-missing data of interest for each timepoint were included in the analyses ($n = 543$ for during pregnancy and $n = 521$ postpartum).

The survey instrument as implemented in the 2007 survey included a nine-item adaptation of the Center for Epidemiologic Studies Depression (CES-D) Scale (Radloff, 1977), life event stressors, and a five-item mental health inventory (Mental Health Inventory-5), as well as information on socio-demographic characteristics of the participants. The participants received the survey by mail and follow-up was conducted by telephone. The LAMB survey was translated into Spanish and Chinese, while a telephone translation service provided access for people who chose any one of the 88 languages. This project was approved by the California Committee for the Protection of Human Subjects. Informed consent was obtained from all participants.

2.1. Dependent variables

Primary outcomes include measures of mental health symptoms that participants reported at the time of survey and retrospectively during pregnancy. During pregnancy mental health was assessed by the Mental Health Inventory-5 (MHI-5). The MHI-5 is a brief screener for depression and anxiety disorders (Berwick et al., 1991; Cuijpers et al., 2009) and was scored so that a higher score indicates poorer mental health. The 5 questions are asked "How much of the time during the past 4 weeks": 1) Have you been a very nervous person?; 2) Have you felt so down in the dumps that nothing could cheer you up?; 3) Have you felt calm and peaceful?; 4) Have you felt downhearted and blue?; and 5) Have you been a happy person?.

Depressive symptoms during the postpartum period were assessed with 9 items adapted from the CES-D (Cronbach's Alpha = 0.86) (Santor and Coyne, 1997) and administered within 4–7 months after delivering a live birth. Participants were asked "How much of the time, during your last 7 days, had you": 1) felt easily bothered by things; 2) could not shake off the blues; 3) had trouble concentrating; 4) felt depressed; 5) felt everything was an effort; 6) sleep was restless; 7) was happy; 8) enjoyed life; and 9) felt sad. Items were coded so that the measure ranged from 0–27 with a higher score indicating greater depressive symptoms.