The effects of commuting on individuals and communities: A brief overview of the literature

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Jesse M. Bardsley
Nicholas J. Finio
Gerrit J. Knaap

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I. Introduction

The National Center for Smart Growth (NCSG), in collaboration with the International Centre for Local and Regional Development (ILCRD), is pursuing a research study examining the effects of commuting on individuals and communities in the context of COVID-related changes to commuting patterns (the InPlace study). In order to situate this research, NCSG has produced the following overview of the literature relating to commuting's relationship to a variety of individual and local factors. The review is intended as a starting point for research; each of the categories presented below has a substantial literature that cannot be fully encapsulated in this report.

II. Physical Health

Commuting has been associated with physical health outcomes in the literature, both in terms of commute mode and commute duration. Active commuting (walking or biking) has been shown to be associated with meeting recommended physical activity guidelines (Baker et al., 2021), lower obesity rates (Bassett et al., 2008), and decreased cardiovascular risk (Hamer & Chida, 2008). Telecommuting has also been shown to promote physical activity (Chakrabarti, 2018). As for the effect of commute duration, a study in Norway (Urhonen et al., 2016) and another in the UK (Künn-Nelen, 2016) both found that those with long commutes had higher numbers of subjective health complaints. Hoehner et al. (2019) and Raza et al. (2021) both reported that increased commute time is associated with decreased physical activity, although Raza et al.'s association did not hold in the highest commute time category. Hoehner et al. (2012) also found associations with adiposity, lower cardiorespiratory fitness, and high blood pressure. Overall, it is apparent that active commuting has health benefits, and that long commutes (presumably dominated by car drivers) have negative associations with subjective and objective health.

III. Subjective Well-Being and Mental Health

Much has been said about commuting's effect on the subjective well-being (SWB) of individuals. The research generally finds that longer commute times are associated with negative subjective experience, but is unclear about whether this unpleasant emotional state has a long-term negative influence on SWB (Chaterjee et al., 2020; Zijlstra & Verhetsel, 2021; Stone & Schneider, 2016). For example, research that measures SWB as overall life satisfaction has often found no relationship with commute time (Clark et al., 2020; Dickerson et al., 2014). However, both of the aforementioned studies did find a negative association between leisure time satisfaction and commuting. Clark et al. (2020) also found that commuting had a negative relationship with job satisfaction and was associated with increased strain. According to classical economic theory, individuals should reach an equilibrium between the labor and housing markets wherein they are compensated for the negative effects of commuting by other positive outcomes, such as increased income or better living conditions (Lorenz, 2018; Stutzer & Frey, 2008). Thus, while we would expect that sub-domains of life satisfaction would be negatively affected by commuting (such as leisure time satisfaction), according to this theory we would

expect overall life satisfaction to remain unaffected. A few studies have challenged this assumption in specific contexts (Sun et al., 2021 in China; Stutzer & Frey, 2008 in Germany).

Clark et al. (2020) also found that commuting was associated with poorer mental health. Further, Wang et al. (2019) found that longer commutes were associated with a modest increase in likelihood (0.5% per 10 minutes of commute) of screening positive for depression in eleven Latin American cities.

Research has also been conducted on the relationship between commuting *mode* and SWB and mental health. Several studies indicate that commuting by car is the least-liked form of commuting and causes the most stress (Runa & Singleton, 2021; Gatersleben & Uzzel, 2007). However, Friman et al. (2013) and Oguz (2014) found that public transport users had the lowest well being scores, not car users. Research seems to indicate that those who travel on bicycle or on foot are the most satisfied with their commute (Friman et al., 2013; Smith, 2017). Martin (2014) found active commuting and public transport use to be associated with better mental health, but noted that several studies did not find this association for active commuting (Humphreys, 2013) or found a contradictory result (Oguz, 2014). Thus, commuting is found to be a low well-being activity with modest negative mental health effects, and car or public transit use is generally found to have the most negative associations. Long-term well-being associations are debated.

IV. Social Capital

Commuting is also hypothesized to affect community social capital. The current study aims to take advantage of the "COVID moment" to shed light on the effects of commuting on communities prior to, during, and after significant COVID lockdowns in Ireland and the United States that temporarily restricted mobility. The existing literature suggests that increased commute distances damage community social capital. However, the term "social capital" suffers from the lack of a concise definition and is multidimensional (Lelieveldt, 2004). Some measurements of the concept focus on cognitive aspects such as trust or sense of duty, and others on structural and behavioral aspects such as participation in community activities or access to certain resources found in relationships.

Many measurements take a structural/behavioral approach. Political scientist Robert Putnam, in his oft-cited and controversial book *Bowling Alone: The collapse and revival of American Community*, found that "each additional ten minutes in daily commuting time cuts involvement in community affairs by 10 percent" (Putnam, 2000, p. 213). He also found that increased commute times experienced by a community affected even non-commuters, positing a "synergistic effect" wherein the effects of commuting "spill beyond" those involved to create an overall depressive effect on community participation (Putnam, 2000, p. 213). Putnam used commuting time as a proxy for the overall effects of sprawl, which not only include the actual time lost to commuting, but also the social segregation and lack of "boundedness" of a community that results from suburbanization (Putnam, 2000, p. 214). Putnam's work has been heavily criticized for ignoring other important variables relevant to social capital, such as globalization and neoliberalism (Steger, 2002) and the salience of power relations (Gelderblom, 2018) among others. Still, his findings about commuting coincide with other research.

For example, Christian (2012) found that increased commute times were associated with decreased time spent with friends by both male and female urban dwellers in the United States, with males also reducing the time spent with children and spouses. Besser et al. (2008) found that higher commute times were associated with not making socially oriented trips in the United States (for entertainment, religious purposes, spending time with friends, etc). Similarly, Mattison et al. (2015) found that commuting by car in Sweden was associated with low social participation in the overall sample, and that this association increased with increased commute time (although one group, women commuting by car more than 60 minutes, was not associated with low social participation). Interestingly, public transit was not associated with low social participation except among those traveling more than 60 minutes.

However, more recent research (Foster et al., 2019) found that miles traveled to work was associated with only a modest decrease in access to neighborhood social capital resources. Foster et al. operationalized social capital as the "development of formal and informal ties that provide access to important resources." (Foster et al., 2019, p. 234). Thus, Foster et al.'s findings do not necessarily conflict with research such as Putnam (2000) that was measuring participation in specific activities rather than access to resources. Still, the result was less than might be expected if commuting is a central factor in social capital decline as posited by Putnam (2000). Foster et al. (2019) also found that increased distance to religious congregations and civic organizations was actually associated with an *increase* in access to social capital resources at these locations, suggesting that people are willing to travel to access these resources.

It is also possible that commuting's effect on community social capital has a strong cognitive dimension that cannot be measured by participation in activities or access to resources; Delmelle et al. (2013) found that those with one-way commutes of 30 minutes or longer in Vienna, Austria had lower levels of social satisfaction. Mattison et al. (2015) (mentioned above) found a negative relationship between commuting and general trust. Cognitive aspects of social capital such as a sense of duty and a sense of trust have been shown to be positively related to some forms of participation (see Lelieveldt, 2004), and thus commuting's effect on these variables could indirectly impact more structural measurements as well. All of these findings indicate the complexity of measuring commuting's effects on social capital, but they show that in general, commuting is associated with its decline.

V. Political Participation

Political participation is another vector through which commuting may affect community life. A resource model of political participation would suggest that decreased free time, such as might be expected from longer commuting, would result in less participation. Research has confirmed this relationship between free time and political participation (Brady et al., 1995). However, research that isolates commuting as a variable suggests that commute *mode* may influence participation while commute *time* has little effect. For example, Hopkins & Williamson (2012) found that the percent of residents driving to work alone in a census tract was negatively correlated with several forms of political participation, including attending a march, attending a rally, attending a public meeting, and being a member of a political group. Williamson (2002), one of the authors of the aforementioned study, also found similar results using a different data set. However, both studies found that neighborhood aggregate or individual *time* spent commuting was not a significant predictor of the political activities they tested, with the exception of petition signing in Hopkins & Williamson (2012). This suggests

that "driving alone" could be a proxy for placed-based neighborhood characteristics associated with suburban environments. In fact, Hopkins & Williamson (2012) found that "driving alone" was strongly negatively correlated with having a "traditional street grid" in the census tract and with scores on Ewing's overall index of sprawl (low scores indicate a high level of sprawl). In that vein, recent analysis has found that "interactive" neighborhood characteristics are associated with increased communication between neighbors, which is in turn associated with increased voting (LeVan, 2020). This lends support to the idea that neighborhood design characteristics could be a factor, although more research needs to be done in this area before conclusions can be drawn.

There are some disagreements in the literature. Newman et al. (2014) challenged the results of Hopkins & Williamson (2012) which negated the importance of commute time, but they were in turn challenged by Gius (2015). Newman et al. (2014) found that increased commute time (but not increased work time) was associated with decreased political participation in an area defined by a zip code, even when controlling for the percent of residents driving to work alone. They proposed a "commuter strain" hypothesis, where commuting drains psychological resources that work does not. This study was challenged in turn by Gius (2015), however, over methodological issues. He found, using the same data set as Newman et al. (2014), that commuting time had no significant association with political participation. Lidstrom (2006) also found that commuting (distance/time) was not associated with a decrease in political participation in Sweden. Thus, while the debate may continue, the primary reliable finding of the research so far on commuting's effect on political participation is that an increased percent of residents driving to work alone is associated with a decrease in political participation. This may be a proxy for features in the built environment.

VI. Local Economy and "Outshopping"

Municipalities that are transitioning from self-sustaining communities to commuter suburbs may also suffer from a decrease in local shopping, which can be harmful to local business and to governments that rely on sales tax revenue. Several studies provide evidence that commuting outside the community encourages purchasing outside of the community, a phenomenon the literature calls "outshopping" (Pinkerton et al., 1995; Shields & Deller, 1998; Findlay et al., 2001; Burkey & Harris, 2003). However, new residents moving into a community have been shown to provide more benefit to local retail sales than those who only work in a community (Shields & Deller, 1998), suggesting that residents may spend more money at their place of residence than at their place of work. According to this logic, communities with new housing construction that is being filled primarily with commuters should still see a substantial increase in local retail sales, as long as the benefit of the increased number of residents is not overcome by the replacement of existing residents with more out-shopping prone commuters. Overall, the research in this area has been sparse and context-specific; more work is needed to confirm the broad applicability of these trends.

It is also important to note that these effects are taking place within a larger economic context where agglomeration economies and other effects of the hierarchical structure of spatial competition may be causing the decline of retail regardless of commuting patterns (Ayres, 1992; Parr & Denike, 1970). Some research indicates that proximity to urban centers may cause decline in rural retail (Johansen & Fuguitt, 1979), but the data is relatively old. Some of the most pertinent forces acting on the retail environment in the United States in more recent years are the proliferation of warehouse clubs/supercenters and the expansion of e-commerce

(Hortaçsu & Syverson, 2015). The rapid rise of e-commerce has received a great deal of media attention and may indeed be hurting local retail. Still, in the third quarter of 2021, in the midst of the COVID-19 pandemic and after decades of rapid growth, e-commerce only accounted for 13% of total retail in the United States (US Census Bureau, 2021), showing that claims that e-commerce will soon make brick-and-mortar retail obsolete are premature (Hortaçsu & Syverson, 2015). The rate of increase in warehouse clubs/supercenters has been even larger in the United States than the rise of e-commerce and may be having an even larger effect on the industry (data is for the period 1992-2013; Hortaçsu & Syverson, 2015). Although the precise effect of these trends on rural retail is as yet unknown, the US has seen a slight trend towards retail locating in more populous counties (Hortaçsu & Syverson, 2015). US retail has also been increasing in scale, with an increasing average number of employees per establishment (Hortaçsu & Syverson, 2015; Johansen & Fuguitt, 1979), which could perhaps signal a moving away from local, smaller shops. Whether these trends are related to commuting is unknown. Thus, while sporadic research does seem to confirm the intuition that more commuting leads to more outshopping, more systematic studies could give us valuable information about the nature of these trends and their size in comparison to other factors operating in the retail environment.

VII. Changes due to COVID-19

The COVID-19 pandemic and the associated government restrictions produced a dramatic change in commuting patterns (Shibayama et al., 2021; Barbieri et al., 2021), with large percentages of people working from home during certain time periods and in certain countries. What kind of long-term impact this might have on commuting is a matter of debate. Several studies have noted the potential of the COVID-19 disruption to provide an opening for behavior change (Salon et al., 2021; Thomas et al., 2021). The idea that contextual shifts can lead to behavior change relies on habit theory, which was studied by Walker et al. (2015) in the context of commuting. They surveyed employee's commute modes before and after a corporate relocation in which the company encouraged employees to switch to more sustainable modes, finding that the disruption of the relocation was associated with many commute mode changes by employees. Further, they found that the "automaticity" of the old travel mode took weeks to decay in employees and that during the same period, the automaticity of the new mode was growing. COVID-19 lockdowns have arguably produced a similar situation in which governments have encouraged people to work from home, and these lockdowns have often lasted for weeks or months, allowing old automatic habits to decay and for new ones to form. Salon et al. (2021) documented some indicators in the United States that may prefigure future shifts. For example, they found that 70% of those who were new to regular telecommuting reported that their productivity stayed the same or increased (see also Shamshiripour et al., 2020 for similar results), and that the percentage of those who expected to telecommute at least a few times each week postpandemic had doubled from prepandemic levels (Salon et al., 2021, p. 1). According to Salon et al., these increases in telecommuting could result in a 15% decrease in commute-related car vehicle miles traveled as well as a 40% decline in transit commute trips postpandemic (p. 2). They also found that Americans plan to bike and to walk more after the pandemic (p. 2).

However, the research is not entirely consistent. Rubin et al. (2020) found that people reported being less productive (contradicting Salon et al., 2021) and liking work less during pandemic-induced working from home. Despite this, among people that reported changing their opinion about working from home, more people now viewed it more positively than those who changed their opinion to view it more negatively, adding further complexity. As far as whether pandemic-induced mobility patterns are persisting, Kim & Kwan (2021) used

daily county-level mobility data collected from cell phones in the United States (provided by Descartes Labs) in order to determine the pattern of mobility change during the pandemic. They separated their data into two waves, the first consisting of the time period from March to June 2020, and the second consisting of June to September 2020. They found that during the first wave, mobility dropped significantly but then recovered to prepandemic levels. During the second wave, mobility remained largely unchanged despite an increase in the number of COVID cases and the continued presence of state-level mobility restrictions. Given the documented increase in working from home during the pandemic, it is possible that this data is simply confirming what some past research has suggested, which is that working from home is not necessarily associated with less driving (Chakrabarti, 2018). It is possible that people who telecommute might choose to live further away from their workplace (Van Wee & Witlox, 2021), but this seems unlikely to be an explanation for the findings of Kim & Kwan (2021) because the short time interval between the start of the pandemic and the collection of the data would likely not provide enough time for people to rearrange the location of their home or work.

It seems possible that this data is instead capturing an increase in non-work trips that is compensating for the decrease in work-related trips, whether from COVID-related lockdown fatigue or for some other reason. This would be in line with the much-debated concept of travel time budgets (TTB), which postulates that at an aggregate level, there is an average amount of time that people set aside to travel and that this is stable despite other changes. If some aspect of their daily journey is made shorter (such as by a more efficient highway or because they can work from home) people (in the aggregate) simply spend their travel time allotment on a greater number of activities or on activities that are further away. Mokhtarian & Chen (2004) provide a valuable explanation of this concept and a summary of the research that has been conducted which both supports and contradicts TTBs. They find that while there appears to be some stability in travel times at the aggregate level in some studies, these results do not appear to hold over all locations or times.

As with any unprecedented large change in society, the long-term effects of COVID-19 are hard to predict. The literature so far seems to indicate caution about accepting claims that dramatic reductions in overall mobility will be permanent, but also shows a possible path through which new habits surrounding work commuting could be formed. These new habits could affect the nature of commuting's relationship to many of the other variables discussed in this literature review even if overall mobility remains relatively constant (for example, if people drive less to work but more to leisure, this could affect people's subjective commute experience). Also, there is a chance that an attitudinal shift towards telecommuting, as yet undetectable in overall mobility, will lead to long-term changes in overall mobility over time.

VIII. Conclusion

With regards to the InPlace study, the research discussed above suggests a few likely outcomes. First, residents who commute longer distances than others should, all else being equal, have lower levels of physical activity than others, and may be at a higher risk of adiposity, lower cardiorespiratory fitness, and high blood pressure. However, the research does not support a case for dramatic physical health effects. Residents commuting longer are also likely to be less satisfied with some aspects of their personal life and spend less time with family and/or friends, although many may be satisfied overall with the tradeoff they are making to commute and therefore have similar overall life satisfaction to the rest of the population. Residents commuting longer will likely have less participation in the community and social activities than other residents, and an increase in

the percent of those commuting by car alone may result in a decrease in political participation in the community. Residents commuting outside of the community will do some of their shopping at their place of work, and thus will not be as beneficial to the local tax economy as a non-commuting resident (while presumably requiring similar per-capita infrastructure spending by the local government).

However, a weakness in the above research is that some of it does not examine selection effects relating to commuters moving into rural communities. Might those who chose to move to the areas in the case study locations have other characteristics that overcome the effects of commuting? This could be especially relevant for some of the InPlace case study communities that are experiencing a rapid transformation from a rural town to a commuter suburb. In order to examine this, longitudinal studies examining within-individual behavior of those who moved further away from their jobs could be conducted to determine whether the increased commute times resulted in negative outcomes. Additionally, longitudinal studies of rural towns undergoing transition to commuter suburbs could be done to examine the before and after status of resident physical and subjective well-being, social participation, political participation, and community economic vitality.

Some of the studies mentioned in this literature review did examine longitudinal/panel data and were able to capture within-individual variation across time. Clark et al. (2020), for example, found that commute duration was negatively associated with the within-individual coefficient for job satisfaction, leisure time satisfaction, and mental health, and positively associated with the within-individual coefficient for increased strain. Lorenz (2018) also found within-individual negative effects of commute distance on leisure time satisfaction and family life satisfaction (see also Dickerson et al., 2014). Künn-Nelen (2016) found that subjective health is significantly negatively associated with within-individual variation in commuting. These results provide strong evidence of causality and indicate that these associations have a higher chance of surviving any selection effects related to residents choosing to move to an outer village. Thus, while there seems to be evidence that negative associations with subjective well-being and subjective health may be robust to selection effects, a weakness in the literature seems to be that we do not have this kind of longitudinal data related to social capital, political participation, and outshopping.

Scale is also an issue that may require further analysis. Especially with relation to political participation and social capital, the size of the community in question may matter. For example, Putnam noted that residents of the United States' largest metropolitan areas have less social participation than other Amercans and that those residing in rural areas are more altruistic, honest and trusting (Putnam, 2000, p. 205). Of the other studies mentioned in the political participation and social capital sections of this literature review, there were none that controlled for settlement size down to a rural village level (the communities involved in the InPlace study are all under 5,000 population). One author, Besser (2008), controlled for metropolitan statistical area size, but the smallest category was 250,000 residents or less. Newman et al. (2014) also controlled for the population of a zip code, but a single zip code does not necessarily substitute for a bounded settlement. Many authors controlled for density (Delmelle et al., 2013; Hopkins & Williamson, 2012; Williamson, 2002; LeVan, 2020), but density does not necessarily correspond to settlement size. Others controlled for urban residence (Mattison et al., 2015; Gius, 2015) or centrality (Williamson, 2002; Hopkins & Williamson, 2012; Delmelle et al., 2013). Still others gathered data that was specific to one city (Delmelle et al., 2013; Foster et al., 2019; Lelieveldt, 2004) or was based on a case study of a few cities (Lidstrom, 2006). It is possible that settlement size could be an unobserved variable affecting all of the findings.

Additional questions also remain. How does "community boundedness" mediate political participation and social capital? Verba & Nie (1972, p. 229-247) found that residents of "bounded" communities were more likely to be involved in most types of local affairs. They defined this quality as "the extent to which the community is an autonomous political, social, and economic unit" and measured it by categorizing communities based on whether they were adjacent to an urban center (Verba & Nie, 1972, p. 243, p. 234). Putnam (2000, p. 214) speculated that this might be the main culprit behind commuting's apparent depressive effect on civic engagement, noting the "spatial fragmentation" between home and work that causes one to have to choose between spending an evening with coworkers or with neighbors. According to Putnam, "commuting time is important in large part as a proxy for the growing separation between work and home and shops" (Putnam, 2000, p. 214). And yet, recent literature does not seem to address this question. In other words, it seems likely that when increasing numbers of people move into a community who do not work in a community, there will be a depressive effect on social participation. However, more research is needed.

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