Contacts and Meetings: Location, Duration and Distance Traveled

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Abstract

The study of travel for social activities presents layered challenges because of the temporal and spatial flexibility with which such activities can be undertaken and the changing set of decision makers involved in each activity episode. This paper seeks to answer a set of questions based on empirical data about how relationship, social network variables, purpose, personal and household constraints, location attributes, and interdependence between meeting duration, distance, and other meetings provide some structure to the observed social activity location and duration decisions. In particular, we investigate what attributes determine whether a meeting takes place in or out of home, and what explains the distance travelled and the duration of meetings. Empirically we show that in-home meetings tend to occur most often with close contacts and less often with distant contacts. When looking at duration and distance travelled, we find that relationship related variables have some of the largest impacts on the distance travelled and the duration of meetings as compared to other variables. We find that meeting durations with close contacts are on average almost 45 minutes longer, and that respondents are willing to hold these meetings about 1.5 miles (2.4 km) further away from their residences than they would with non-close contacts. Overall the paper illustrates that relationship type, as well as other meeting specific and demographic variables are important in explaining the location, duration and distance travelled for social meetings.

1 Introduction

According to the 2009 US National Household Travel Survey (NHTS), social and recreational trips make up just over a quarter of annual person trips for both men and women (Santos

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et al., 2011). In contrast, trips to or from work made up about 14% and 18% of person trips for women and men, respectively. While the NHTS number conflates social trips with non-social recreational trips, it highlights the importance of understanding these *relatively unstructured* travel purposes in order to fully understand travel behavior as a whole. We say these trip types are relatively unstructured because of the temporal and spatial flexibility of social activities, and the absence of outside structures (in contrast to work start and stop times, work place location) that force temporal and spatial regularities on such activities. Social activities are limited by the indirect constraints of activities such as work, in interaction with the built environment and transport technologies, which dictate when and where these activities/trips cannot take place.

Another important difference between social activity trips and trips such as work or shopping lies in who is involved in the decision making regarding timing, location, and duration of the activity. Often for work or shopping type trips, either the trip maker or her household are primarily responsible for these decisions. The temporal and geographic dimensions of social trips on the other hand are dictated by people who live often in different households, each of whom have their own constraints, but also desire to make their temporal and geographic paths intersect. As a result, it is not sufficient to describe the person or their household only, as is often done in work or shopping of trips, but some measures of whom they are meeting and their constraints require explicit consideration.

While understanding the 'other' in the interaction is important, yet another challenge for understanding these trips is that each meeting episode may involve a different 'other' or 'others'. The average person has a network of about 150 people (Hill and Dunbar, 2003) who play different roles of support, close or distant friendship, kinship etc. (Wellman and Wortley, 1990). These relationship types or roles in turn may affect the characteristics of the meetings - their frequency, location, timing, as well as whether travel is needed to realize the meeting. Some meetings occur by phone without any travel; sometimes they occur in residences where at least one party has to travel, or other times they can take place at mutually agreed places outside of the home of either party. Who is met, where the meeting is held, for how long, depends on the purpose of the meeting as well as the nature of the relationship. Incorporating such nuanced information requires an understanding of the nature of relationships and their spatial distribution.

Further, as with other travel decisions, trip costs also likely affect these location decisions. Technology may play a role that mediates the nature, frequency, or other attributes of the meeting. Across places, socio demographic as well as other cultural factors may also play a role in the spatial distribution of social networks (Kowald et al., 2013), and these patterns in turn can influence the patterns and behavior of travel.

Travel for social activities thus present layered challenges —from the flexibility with which these activities can be undertaken to the different decision makers involved and the relationships between the meeting parties. Each meeting episode requires decisions of when, where, and for how-long meeting episodes will last. These decisions are jointly made (e.g.

as opposed to say the mode used to arrive at the meeting location) and have important implications for travel outcomes such as how far an individual is willing to travel, subject to other personal contraints. In this paper we seek to understand how relationships and network variables impact decisions about location, the duration allocated for such activities, and the distance people are willing to travel for social engagement. We study the network or relationship influence on these decisions while also controlling for urban area characteristics and personal constraints that can also affect these decisions.

The rest of the paper is organized as follows: the next section presents background research. That is followed in Section 3 with the analysis framework. Section 4 provides a description of the survey and data. Section 5 presents the analysis which looks at the dichotomous in-home/out-of-home location decision and presents a structural model that investigates the relationship between network, personal and household variables, and how these influence meeting duration and meeting distance. The final section presents a summary and discussion.

2 Background

Several authors have pointed out that social activities have much less structure than travel to work (Axhausen, 2002; Ohnmacht et al., 2009; Páez and Scott, 2007). The structure placed on work trips at the individual level by employer location and employer policies are not present for social meetings; meeting locations can vary from day to day, as can the time at which meetings takes place; meeting frequency can vary significantly from person to person or even for the same person from week to week. This is not to say that there is no fixity to social engagements at the individual level. In fact many people have regular times for a weekly lunch, a regular game, etc. and these may in turn structure other activities. Broadly speaking across individuals however, the conditions that structure social activity travel are not many, and those that are present likely come from the fixedness of residential locations, employment locations, auto-mobility, working hours, household constraints of the meeting parties, the operating hours of the meeting locations (when meetings occur outside the home) and the physical limitations that Hagerstrand (1970) discusses.

Arguments that social contacts ought to be incorporated into an understanding of individual travel behavior have been made by different researchers (Arentze and Timmermans, 2008; Arentze et al., 2012; Ettema et al., 2011; Hackney and Axhausen, 2006). Networks of friends and family are no longer situated locally in people's neighborhoods and maintenance of the relationship through joint activities requires travel. Wellman's 1979 study for example notes that the majority of people's core contacts were not local. Increasing suburbanization since that time, particularly in the U.S., likely means even more separation has occurred within urban areas among contacts. As urban spaces expanded and contacts dispersed, one possibility was the weakening of relationships and a decrease in meeting frequencies. However, though face-to-face and, to a lesser degree, phone contact frequencies have been

shown to be sensitive to distance, the evidence suggests that people continue to maintain these ties even over long distances (Larsen et al., 2006; Mok et al., 2007; Tilahun and Li, 2015).

Researchers have shown that the characteristics of a person, their social network, and the characteristics of individual relationships within the network, influence travel decisions as well as activity duration decisions. Carrasco et al. (2008) for example employ concepts of *accessibility* of network members and *agency* of persons to investigate social networks and social interactions. Their work highlights the roles that both the type of social network and the person's willingness to meet (agency) play in the decision to travel for social activities. For instance, they find older individuals seem more passive in initiating contact, and those with larger and fragmented networks are more actively engaged in their networks. Habib et al. (2008) also look at with whom social activity is engaged and start time and durations of social activities. They find differences in, for example, gender and household structure in explaining who is involved in meetings. They also find that the presence of children reduces duration while number of people involved in a meeting increases it. Using data from students, Ettema et al. (2011) investigate patterns of meeting distances controlling for the residential locations of the meeting parties. Their findings discern four patterns, three of which depend on the distance between ego and alter's home locations and a forth that depends on the quality of destinations. The study highlights that a better understanding of leisure social travel is achieved through considering relations rather than the individual (Ettema et al., 2011).

Researchers have also looked at the geography of contacts and the role played by technology in mediating relationships. Larsen et al. (2006) find that people's social networks include strong ties at both near and far distances and that modes of communication among close ties are sensitive to distance. When spatial distance increases, the frequency of face-to-face meetings, phone calls, and messaging declines, while the frequency of email communication rises. However, they also note that after a certain distance, frequency of face-to-face meetings are no longer sensitive to rising costs. They argue that maintaining relationships required some co-presence even though the technological means for keeping in touch were available. Frei and Axhausen (2009) also find that meeting frequency and meeting mode (face-to-face, phone, email, etc.) vary by relationship type. They also show that the frequency of face-to-face meetings, phone calls, and SMS messages were sensitive to distance between corresponding parties.

Even among close ties, other aspects of the relationship may also be important in informing meetings. Not all strong ties serve the same purpose; close kin tend to provide financial support and companionships are more likely with siblings and close friends than they are with parents (Wellman and Wortley, 1990). These roles in turn can influence the extent to which face-to-face meetings as well as overall communication occurs among network members.

The possibility of video meetings, using computers and increasingly smart phones, has also entered the mix of potential meeting alternatives. Though these provide a much more

engaged experience over voice only calls, the experience they afford is not the same as a physical meetings. Spending "face time" with someone implies sharing the the totality of the environment at that moment. Such interaction is markedly different from what widely available technologies (at least currently) afford users first because, the parties are in two different environments, and second, because they require either constant engagement over the duration of the communication (as in a phone or video call) or are asynchronous (as in email). Larsen et al. (2007) also discuss how the qualitative elements of face-to-face interactions —sharing a meal, a hug, and co-presence in a shared space —which technology cannot make possible, necessitate long distance travel. Urry (2003) also argues co-present conversations are essential to the establishment of long term relations that require trust. Indirectly though, technology does offer a dimension that makes face-to-face meetings. For example, it introduces flexibility by removing the need to travel for some meetings and freeing up time for others that can be carried out face-to-face (Dijst, 2009; Miller, 2005; Tillema et al., 2010; Urry, 2003). It also serves as the medium that keeps relationships alive through regular interaction when face-to-face meetings cannot occur regularly.

As with other travel, aspects of work or household responsibilities also likely affect the extent to which travel for social engagement occurs. For workers, for example, one can posit that a significant amount of structure to the times, duration, and location of social meetings is imposed by the locations of home and work, and the time constraints placed by employment and household responsibilities. Flexibility at work may mean more engagement in travel for social activity and rigidity in schedules, the opposite. Harvey and Taylor (2000) for instance found that telecommuters travel longer for social interactions. The authors see this as traveling to compensate for the lack of social interaction at work; alternatively, those with flexibility may accommodate their more time-constrained contacts by taking over more of the travel required for face-to-face meetings. In either case, it reflects that the relaxation of time constraints at work are coupled with increased ability to travel for social activity.

In part the question of social networks and travel is a question of the geography of contacts. Residential locations serve as origins, as locations of joint activity, as well as final stops for most out-of-home tours, thereby anchoring networks and the type of travel demand these networks engender. Illenberger et al. (2013) show that the probability of accepting a person as a contact scales in distance following a power law. Kowald et al. (2013) also note that their networks from four different countries each show a power law distribution within 100km. Such characterizations of the relationships between networks and geography, along with an understanding of the structure of networks, and the decisions around joint social activity travel making, would allow for the simulation of networks in disaggregate agent based travel models. Arentze et al. (2012), for example, have demonstrated how synthetic social networks that resemble the structure of real networks may be simulated using a friendship formation model with homophilly and distance variables. Our study looks at the travel behavior and time allocation decisions around these meetings. Others look at which members of networks play active roles in the decision to meet as described earlier.

The foregoing discussion highlights the importance of several variables including networks,

tie strengths, work place constraints, demography, and technology in informing different aspects of social meetings. In this paper we focus particularly on the location of social meetings. Using survey data, we describe the types of meetings we observe over a one week period. We investigate how relationships, purpose, and other attributes affect the decision to have such meetings in-home. We also investigate how these and other variables affect how far people are willing to travel for out-of-home meetings and how much time is allocated for such meetings. In the next section we describe the analysis framework.

3   Analysis Framework

In this paper, we are primarily interested in understanding what factors play a role in the decisions regarding location and duration of social meeting. Duration is simply the time spent at the meeting and we dichotomize location decisions as in-home or out-of-home, with distance from home, being the primary measure we use to understand how far an individual may be willing to travel to spend time with network members. Despite the substantial flexibility around the particulars of social meetings, there are attributes that provide some structure to social meetings. These include the nature or purpose of the meeting, the personalities in the meeting and their relationship, tastes about travel and constraints placed by other household attributes, neighborhood level variables that have to do with locational opportunities for such meetings. In addition, the two variables —distance travelled and duration —may also affect each other. Further, prior (or subsequently) planned meetings may also play a role in determining duration as well as location if individuals have a certain budget/tolerance for how much traveling or how much time they want to spend on meetings. Below we outline some of our hypotheses about the above attributes and their relationship to meeting location and duration.

Purpose: While some meetings may be purely functional (e.g. career networking), others are likely much more informal and less goal oriented on an episodic basis. For functional meetings, we anticipate there would be much more structure about place, duration, timing, as well as planning that we may not expect when meetings involve friends or family members. For leisure trips, we anticipate that durations would be longer and we expect more willingness to travel longer for such meetings.

Relationship: We expect relationship type to mediate the location of the meeting. Some meetings may be held in private residences, and as we will argue below, not everyone is likely to be invited to someone's home. When meetings take place outside of a residence, we hypothesize that individuals would be willing to take on longer distances for closer contacts. In the same way, we also anticipate longer durations for closer contacts. Other research has also noted the importance of relationship variables on different aspects of meetings as discussed in the background section.

Personal and household preferences and constraints: While we anticipate that general tastes about travel and social time would inform how far or for how long one would meet, we expect decisions to be influenced in observable ways by the presence of children, whether a person works full time, age, and gender. We expect a relaxing of some of these constraints (e.g. on weekends when persons are less likely to work) would result in longer meeting times as well as longer distances being travelled. As we note in the background section, impacts of household and personal characteristics have been found (e.g. (Carrasco et al., 2008; Habib et al., 2008)). In addition, as a proxy measure of whether the person places importance on social contacts, we use the presence of close social contacts in a 3 mile (4.8 km) radius of their residence. If a respondent says at least 5% or more of my closes contacts have their residences within 3 miles (4.8 km) of my own, we assume this reflects a conscious residential location decision by the respondent that prioritizes such closeness over other amenities in the metro area.

Duration, Distance and other Meetings: We anticipate that meeting duration and distance travelled are also interdependent on one another. We hypothesize that individuals are willing to travel longer distances for longer duration meetings. As the meetings we are looking at are mostly pre-arranged, we anticipate that decision makers know approximately how long the duration may be. We imagine it would be unlikely a person would travel 10 miles (16 km) for a 5 or 10 minute duration but they may well travel that distance for an hours meeting or a half hour meeting. Schwanen and Dijst (2002) argue that similar tradeoffs occur between work time and commute time. Of course, it may also be the case that once travel has taken place, people may engage longer and may allow the planned time to extend given the already incurred travel costs. We test for both of these possibilities. In addition, we also anticipate that other meeting commitments may affect the duration of specific meeting episodes. For instance, the person expecting to have seven meetings over the course of a week may opt for meetings that are of shorter duration or of shorter distances as compared to one that may have only one meeting.

In-home vs. out-of-home meetings: Whom we invite into our private spaces of residence, at what times, etc. depends on the nature of the relationships we have developed (or seek to develop) with the social contacts. While meetings with close contacts may take place in-home or out-of-home, we expect that meetings with non-close contacts to often not occur in private residences. When in-home meetings occur, we expect closer relationships with the alters, we anticipate more planning and longer durations for the meeting. In-home meetings eliminate travel for the person being studied - distance travelled is 0. Qualitatively, meetings 0.25 miles (400 m) out of the home (say at a neighborhood cafe) may be more similar to a meeting 5 miles (8 km) away than they are to in-home meetings. For this reason, we model the location decision of in home and out-of-home meetings separately to understand its determinants. Later, when we study meeting time allocation, these variables enter as exogenous attributes that influence the duration and distance travelled to a meeting. Work commitments can have significant implications on in-home meetings. For example, Costa and Kahn (2001) attribute women's labor market participation for declines in the probability

of entertaining at home. In our study, we expect in-home meetings to be more likely on weekends rather than during workdays due to work commitments of the hosts, guests or both.

In this paper then, we develop two models - one that studies the determinants of in-home and out-of-home meetings. We then use a structural (path) model to understand the influence of the different variables listed above on meeting duration and distance travelled. We anticipate that relationship and meeting purpose mediate the nature of the meetings that the transportation analyst seeks to understand in ways that are not obvious if we don't study or control for the relationship itself. We also test for the interdependence of duration and distance, as well as the impacts other meetings may have on each meeting episode. In the following section we discuss the data used, followed by the analysis performed.

4   Survey and Data

Data for this study comes from a two phase web based survey that was administered to gather data on job finding, home finding, meetings that people participate and the social and technology networks that help them in these processes in 2007 and 2008. Participants were recruited through mailed postcards. Postcards were sent to eight zip code areas in the Twin Cities to 5000 people in each of the two phases. The areas were chosen to have an economic and racial mix of respondents, as well as a city and suburban mix in the respondent pool. Reminder postcards were sent a week following the original mailing. Invited respondents were asked to login to the survey with a unique code placed on the mailed postcard. The survey offered a \$5.00 gift card to participants as well as a chance to be included in a drawing for an iPod Touch for one randomly selected respondent in each phase. The survey was done as part of a larger study which also looked at the role of social networks in finding employment and as a result household members who were working adults were requested to respond to the survey.

On first mailing 192 and 205 cards were returned due to wrong addresses from each phase. Overall there were 268 and 297 respondents in phase 1 and 2 respectively (5.8% of postcards that reached their destination). The response rate for the survey was low and perhaps could have been increased by repeated solicitation to the respondents. In addition, because the questions went into the details of people's contacts and daily schedules, privacy concerns may have led some to drop out or skip questions. Availability of a computer and access to the internet in lower income areas may also have contributed to the low response rate.

The meetings data used in this paper was collected in the second phase of the study. The distribution of demographic variables among the respondents in phase 2 (from whom data for the current study was collected) and that for the Minneapolis - St. Paul Metropolitan Statistical Area (MSA) from the American Community Survey (ACS) for 2006-2008 is given in Table 1. The proportion of women in the sample was higher than that for the MSA, and

the sample tended to have higher educational attainment than the region. The median age, tenure type, mean and median household incomes and racial breakdown in the sample were close to that reported for the region. All but two respondents in the analysis here had at least one vehicle in the household.

Broadly speaking, the survey focused on four areas. The first section dealt with the experience of the respondent during their last job search. Respondents were asked how they found their job, including whether contacts were used, and if so, details on the contact. The second section dealt with their residence, including when they moved and what their reasons for moving were, the third section dealt with the respondent's social contacts and their social meetings over the period of the previous days. In this section respondents were asked how many close contacts they had (those that they communicate with at least twice a month), where these individuals reside relative to the respondent's home, and to report details about social meeting they had in the previous seven days. Finally, responses were gathered about the respondent's commute and demographics.

Respondents were asked to list all scheduled meetings they had in the previous seven days outside of their work location, including all meetings with family, friends, get togethers, parties, civic engagements, meetings for personal/home related tasks, first time meetings and so on. All responses were based on the person's recall. The survey was presented as a table with a row for each meeting. Each row had a series and drop-down lists and blank spaces where the respondent provided details of the meeting. The first row of the table was completed with an example that respondents could follow. For each meeting, respondents reported how the other person in the meeting was related to them, what time the meeting started, the duration of the meeting, the date and location of the meeting including the nearest intersection, the mode used to reach the location, the purpose of the meeting, how they usually communicated with the respondent, and how the current meeting was scheduled. The survey instrument is provided in Tilahun (2010).

5 Analysis

5.1 Data Summary

This section summarizes the data on reported by respondents. The analysis is limited to meetings that happened within the metropolitan area. There were 744 meetings from 222 respondents that took place within the metropolitan area. Over the period of seven consecutive days, many people had more than one meeting. The distribution of number of meetings per person is given in Figure 1. The figure shows a sudden drop at 7 meetings. The survey was designed with 18 potential meetings to be reported, with six to a page. We suspect the drop may have been caused because some respondents may have chosen not to complete a second page of detailed meeting questions. We assess the potential impact of this censoring on the model we estimate by looking at individuals with five or fewer meetings separately. We find

Table 1: Summary of Survey Subjects

Variable	Group	Survey	Minneapolis-St. Paul MSA
Gender	Male	38.9%	49.7%
	Female	61.1%	50.3%
Age	Median	37	36.3
Household	Renter	21.7%	25.8%
	Owner	78.3%	74.2%
Education (MSA data for those 25 and older)	Less than high school	0.8%	7.4%
	High school	19.5%	46.7%
	Associates degree	13.2%	8.9%
	Bachelor's degree	44.7%	25.1%
	Grad/Professional degree	21.8%	11.9%
Household Income	Mean	$ 78,860	$ 84,527
	Median	$ 70,000	$ 66,281
Race	White	87.7%	86.2%
	Black	4.6%	7.4%
	American Indian	0.4%	1.2%
	Asian	3.1%	5.4%
	Other	4.2%	2%

that the estimates and conclusions we derive from the full data was consistent with what we found with the responses of those individuals who reported five or fewer meetings.

Of the 744 meetings reported, location description was given for 738, about a third of which (32.5%) occurred in-home, either at the respondent's residence or their contact's residence. The data also illustrates that the proportion of meetings that occur inside a home on weekdays is smaller than on weekends. Of 737 meetings for which location and date is known, in-home meetings make up just over a quarter of weekday meetings (26.3%), and 44.1% of weekend meetings. In addition to the significant numbers of meetings that take place at residences, the home to meeting distances also reinforce the need to consider contacts more closely in travel behavior studies. The total home-to-meeting distance reported in the data is 4860 miles (7821.4 km), of which home to friend's residence distance accounts for 25%. These numbers further illustrate the need to closely study contacts, including their residential location distribution, to account for such travel.

Table 2 shows the average and median home to meeting distances on weekends on weekdays respectively. The first two columns and the last column look at out-of-home meetings only. In general meetings tended to be closer to home than to the respondent's work. When meetings take place at family/friends' homes on weekends, both the average and median distances were longer than the other categories. Meeting locations with family and friends,

when they occur out-of-home on weekdays, are similar to the overall weekday averages.

Table 2: Mean and median distances for out-of-home meetings (mean/median)

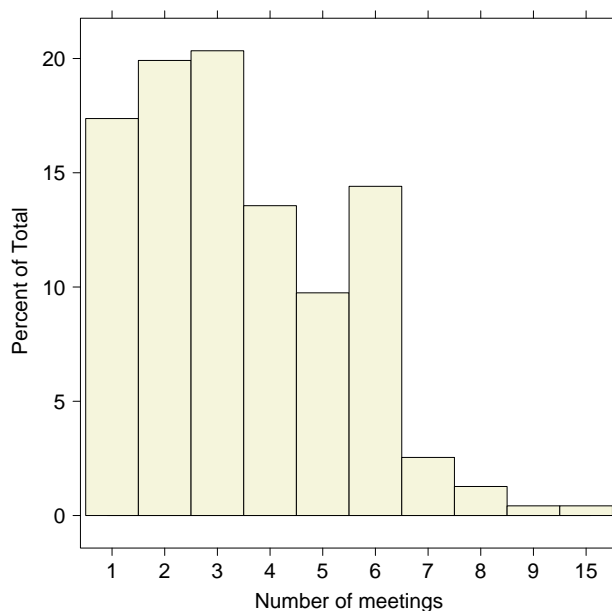|	Distance:	home to out-of-home meeting	work to out-of-home meeting	home to friend's or family home	home to out-of-home meeting with family/friend only
Weekday	miles	7.26/6.13	9.5/7.93	8.68/7.32	7.20/5.89
	km	11.68/9.87	15.29/12.76	13.97/11.78	11.59/9.48
	N	349	334	161	44
Weekend	miles	7.59/6.34	9.98/9.26	13.25/12.03	8.52/7.0
	km	12.21/10.20	16.06/14.9	21.32/19.36	13.71/11.27
	N	144	138	78	46

Figure 1: Distribution of number of meetings for the seven days prior to taking the survey

About half of the out-of-home meetings reported in the seven day period are either with close friends (29.7%) or family (19.5%). These two groups also constitute 75% of in home meetings and about 58% of all meetings (including in-home meetings). The rest are divided between other types of contacts as shown in Table 3. Meetings that involve more than one person constituted 7.5% of all out-of-home meetings. As Table 4 shows many of these encounters were leisure meetings. Leisure accounted for 63%, business 10%, and non-leisure and school related meetings accounted for a further 10%. Purposes for other meetings were either not responded to or identified as other.

Table 3: Proportion of meetings by contact relationship

Relationship	All meetings(%)	In-home meetings(%)	Out-of-home meetings(%)
Close friend	33.7	41.8	29.7
Family	24.2	33.8	19.5
Coworker	7.5	3.4	9.5
Business contact	6.5	2.1	8.7
Church contact	6.1	2.1	8.1
Club contact	4.7	3.4	5.4
Distant Friend	3.3	3	3.5
Neighbor	3.2	5.9	1.9
Multiple persons	5	2.5	6.2
Other	5.7	2.1	7.5
Total	719	482	237

Table 4: Proportion of meetings by purpose

Meeting purpose	Percentage
Leisure	63.2
Business	10.4
School related	3.5
Non-leisure	6.2
Other	10
Unreported	6.8

Within the respondent pool, meeting location choices also show difference among different demographic pools. For instance, single male and females in the respondent pool reported about 75% and 72% of all their meetings to be out-of-home. Looking at weekend meetings separately however, 50% of single men reported their meeting to be out-of-home as compared to 65% of meetings for single females. On the other hand, females and males in multi-person households report similar out-of-home meeting proportions for both weekends (54% and 53%) and weekdays (70% and 73%). These numbers suggest both differences in gender specific preferences on the location of meetings, and how these may be tempered by household constraints.

5.2 In-home and Out-of-home Meetings

Decisions on where to have a meeting depend on a variety of factors that have to do with the characteristics of the persons involved, their relationship, the purpose of the meeting, and the meeting locations available to choose from. Possible locations for the meeting include the residences of the parties involved and, in most urban areas, a multitude of out-of-home

locations where these short term engagements can take place. In this section we will first investigate how in-home/out-of-home meetings differ from one another. The next section will look at the different characteristics of out-of-home meetings separately.

We hypothesize that that in-home meetings are significantly different from out-of-home meetings in several respects, including the type of contacts that participate in them, the duration of these meetings, and which type of households have them more often than others. This is in part based on a belief that people would be more selective about whom they invite into this space, and that this selectivity would make at-home meetings of a different character from even those meetings that may be held at very close proximity to the home. In general we expect that the type of relations to be invited at-home to be mostly close friends and family, and that more likely these meetings would involve leisure activities (entertaining), and would be of longer in duration.

In addition to the relationship, purpose and duration, household constraints can also inform the location choice. Larger household sizes for example imply the need for coordination, and possibly increased costs when meetings occur at outside establishments. Individuals that have larger household sizes therefore would be expected to have relatively more meetings at home than out. Other variables that can inform the location choice also include how long a person has lived in their current residence; if longer tenures imply that people like their residence, then these individuals may also be more likely to show it off to their contacts further increasing their in-home meeting proportion. The variable also suggests more familiarity with the residential area and the opportunities out-of-home that may be present for social meetings in their vicinity. We also test if a person living far from downtown in more suburban environments is more likely to have in-home meetings.

Since each respondent in the data has multiple observations, we first use a mixed binomial logit model to estimate the model. However, the model was not statistically different from the basic logistic model, suggesting that there isn't much person to person variation in these tastes. Rather, the decision appears to be primarily influenced by attributes of the person, the relationship and the meeting. The estimated model is as shown below:

$$log(\frac{\pi_l}{1 - \pi_l}) = \beta_0 + \beta_1 C + \beta_2 N + \beta_3 C_{p3} + \beta_4 M_p + \beta_5 T_{mt} + \beta_6 W + \beta_7 G + \beta_8 A + \beta_9 E + \beta_{10} H + \beta_{11} Y_h + \beta_{11} F$$

where

π_l: The probability that a meeting occurs out-of-home

C: Close contact (family or close friend, $1 = $ yes, $0 = $ no)

N: Neighbor ($1 = $ yes, $0 = $ no)

C_{p3}: Proportion of contacts that live within 3 miles (4.8 km) of respondent's home exceeds 5% (1=yes, $0 = $ no)

M_p: Meeting purpose ($1 = $ leisure, $0 = $ otherwise)

T_{mt}: Meeting duration (in hours)

W: Weekend meeting (1 = yes, 0 = no)

G: Gender (male = 1, female = 0)

A: Age

E: Education (0 = high school graduates, 1 = above high school)

H: Household size (1 = single, 0 = otherwise)

Y_h: Tenure at home (years)

F: Does the person telecommute? (1 = yes, 0 = no)

The estimated model is given in Table 5. Many of the variables are highly significant and illustrate that out-of-home meetings differ from in-home meetings in several respects. The nature of the relationship with the person the respondent is meeting has a significant influence on whether a meeting is held in-home or out-of-home. We use three categories in this model to capture the effect of relationship: (*i*) close relations, identified as close friends and family, (*ii*) neighbors, and (*iii*) other relations (see Table 3 for the possible categories). We find that separating family and close friends into separate categories did not add value to the model. In addition, differences were not detected in other specifications where those grouped as "other" (the base category) in the final model were separately represented. Meetings with close contacts were more likely to occur in-home as compared to meetings with less closer contacts. Close contacts made up three quarters of all reported in-home meetings. The only other group that is more likely to be met in-home than out is neighbors. Over 80% of the reported meetings with neighbors in this data are also of durations longer than a half hour.

The model indicates that the choice to have an in-home meeting depends in part on the relationship with the person being met. When the meeting party is a close contact or a neighbor, in-home meetings are more likely. On the other hand, whether more of the respondent's close contacts lived within 3 miles (4.8 km) of the respondent's home was not important in explaining the in-home/out-of-home decision for particular meetings. Meetings whose purpose is leisure, whose duration is longer, and which take place on weekends were more likely to occur in-home. Those who have larger family sizes, or respondents who reported an education level at or below high school also tended to report in-home meetings all other things equal. On the other hand, if the person telecommutes or if they have lived in their home a long time, they tended to have out-of-home meetings. Age and gender did not affect preferences for in-home or out-of-home decisions. Location of respondents home as measured by distance to downtown was also not relevant and dropped out of the model.

The tendency for longer durations of in-home meetings can in part be due to the fact that many of these are leisure meetings with close contacts, and can flexibly be extended beyond what was planned. Constraints such as closing times etc. would not strictly apply to such

Table 5: Binomial logit model of in-home/out-of-home meeting choice (1=out-of-home, 0=in-home)

Category	Description		Estimate	Std. Error	z value	Pr($>$|z|)
Relationship	Close contact	C	-0.805	0.232	-3.47	0.001***
& Network	Neighbor	N	-2.101	0.502	-4.19	0.000***
Variables	% close contacts within					
	3 mi (4.8 km) of residence	C_{p3}	0.279	0.207	1.35	0.178
Meeting	Purpose (Leisure)	M_p	-0.678	0.248	-2.73	0.006***
Variables	Duration	T_{mt}	-0.198	0.054	-3.69	0.000***
	Weekend	W	-0.493	0.189	-2.61	0.009***
Personal	Gender	G	0.196	0.201	0.97	0.331
attributes, &	Age	A	-0.006	0.012	-0.52	0.600
household	Education	E	-0.591	0.255	-2.32	0.020**
variables,	Household size	H	-0.216	0.072	-3.02	0.003***
schedule	Home tenure	Y_h	0.029	0.017	1.66	0.097*
flexibility	Telecommute	F	0.563	0.222	2.54	0.011**
	(Intercept)		2.82	0.543	5.19	0.000***

Goodness of fit

Log likelihood	-355.96	
Observations	668	
LR χ^2 (13)	122.90	$Prob > \chi^2 = 0.000$
Psuedo-R^2	0.147	
significance	$*** < 0.01$ $** < 0.05$ $* < 0.01$	

meetings. It may also be that the home was chosen as the location to provide a more relaxed longer duration encounter even during planning.

About 32% of the respondents indicated they occasionally telecommute to work suggesting some level of flexibility on their work schedule. On average these individuals tended to report meetings outside of the home as compared to their counterparts that responded they don't telecommute.

As noted, tenure at home is positively but weakly associated with out-of-home meetings. Taking a closer look at those with home tenures greater than 10 years, overall these individuals reported higher frequencies of meetings with neighbors and church contacts and fewer meetings with close friends as compared to others that had shorter home tenures ($p = 0.007$ using a chi-squared test of independence). Their out-of-home meetings also included a higher proportion of church contacts relative to those with shorter tenures at their residence ($p = 0.026$).

The model also illustrates that weekend meetings are more likely to occur in-home than weekday meetings. In addition, it illustrates that single individuals are more likely to meet

outside of the home relative to those in multi-person households. Finally, we tested if persons whose residential location was close to a large proportion of their close contacts preferred in-home meetings (C_{p3}, which measures the proportion of close contacts that live within 3 miles (4.8 km) of the respondent's residence). We find those reporting yes were not significantly more likely to have in-home or out of home meetings. As we noted earlier, these decisions appear to be influenced meeting by meeting, and we do not find a person to person variation in the tendency to prefer out-of-home meetings as compared to in-home meetings by using a mixed logit model.

5.3   Distance travelled and duration of meetings

Just as relationships affect the in-home/out-of-home choice, they may also influence the distance travelled to and the duration of out-of-home meetings. In this section, we model the duration of all meetings and distance travelled while also taking the in-home/out-of-home decision as exogenous to the distance duration decision. As we indicated in section 3, we anticipate the meeting purpose, the relationship, personal/household constraints, location of the respondents neighborhood, and other meeting attributes to impact the meeting location and duration. We primarily focus on meetings that occur within 50 miles (80.5 km) of the respondents home - essentially within the metropolitan area or just outside of the metropolitan area of the Minneapolis-St. Paul region.

We propose a structural model with manifest variables (a path model) where the effects of different variables is modeled explicitly. Path models employ both standardized and absolute (measured) variables in estimation. For the standardized estimates, each of the variables is adjusted so that its mean is zero and its standard deviation is equal to one. The standardized estimates of the path model estimate how many standard deviations the endogenous variable moves in response to a change in one standard deviation of the exogenous variable when all other variables are held constant. The regression coefficients, estimated from the observed variables, measure the contribution of each of the independent variables on the dependent variables. Miller (1977) summarizes the assumptions behind path models and Golob (2003) provide a discussion of structural models for travel behavior studies.

Our proposed initial model is shown in Figure 2. It includes the four attributes of sets of variables we hypothesis provide structure to social meetings —purpose, relationship, personal and household constraints, and interdependence between duration, distance and interactions with other meetings. Meeting attributes are captured by the leisure purpose; relationship is captured by the contact's closeness to the respondent; personal and household constraints enter by age, sex, and the presence of children under 12, and whether the meeting day was a weekend indicating flexibility from work. In addition, under the personal category, we test if persons who report that more than 5% of their closest contacts live within 3 miles (4.8 km) of themselves have different preferences as compared to those with fewer close contacts within the same radius. This variable serves as a proxy for the importance respondents place on geographic closeness to core contacts as evidenced by their residential location.

To control for interdependence between duration, distance, and other meetings, we introduce the number of meetings the person reported for the week to evaluate if those with more meetings had shorter distances or meetings as compared to others. In addition, we hypothesize that duration (which we assume the decision maker has a good idea about when making the meeting arrangement) has a direct impact on the distance they are willing to travel. For reasons presented earlier regarding the in-home/out-of-home meetings being qualitatively different, we control for whether a meeting occurred in the respondents home or out of a residential location. Finally, since each individual occurs multiple times in this data, we first fit the model as a generalized structural equation model (GSEM) using Stata software (StataCorp, 2015). However, the estimates of the model were not different from the SEM model that doesn't correct for repeated measures. We therefore opted to use the simpler SEM model without a random intercept term which we report below. Figure 3 shows the final structural model we estimated after removing variables whose impacts were not significant.
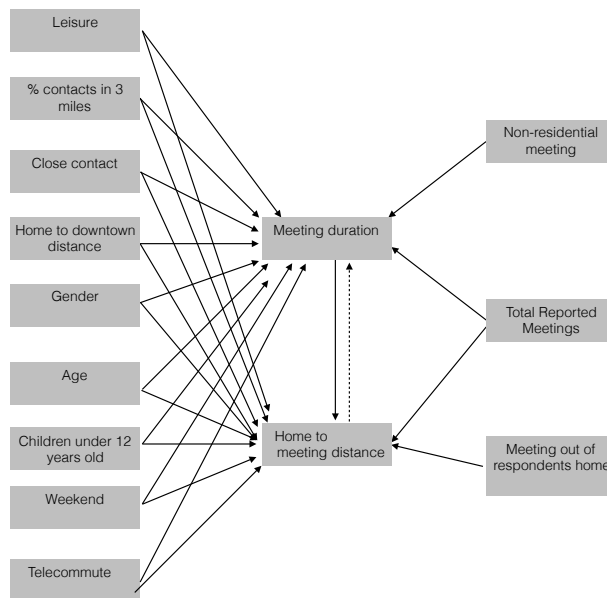

Figure 2: Proposed path model for meeting duration and distance to meeting location

The variables included in the final path model are:

$$T_{mt} = \beta_{t0} + \beta_{t1}A + \beta_{t2}G + \beta_{t3}H_{12} + \beta_4 O + \beta_{t5}C + \beta_{t6}W + \beta_{t7}C_{p3} + \beta_{t8}S$$

$$D_{mt} = \beta_{d0} + \beta_{d1}T_{mt} + \beta_{d2}A + \beta_{d3}G + \beta_{d4}O_r + \beta_{d5}C + \beta_{d6}F + \beta_{d7}W + \beta_{d8}C_{p3} + \beta_{d9}S$$

Where:

T_{mt}: The meeting duration (in hours).

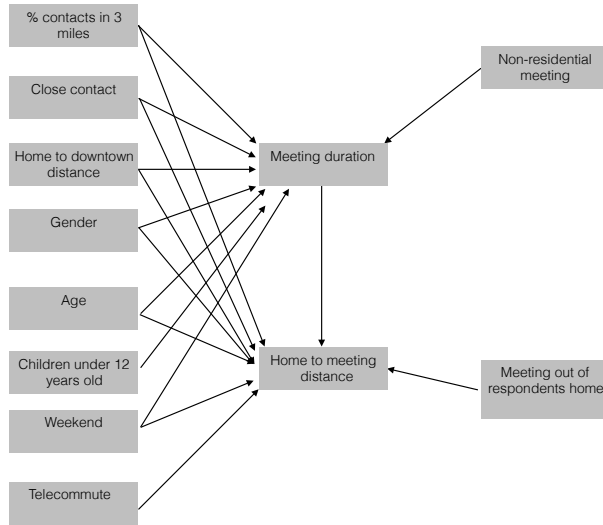D_{mt}: The home to meeting location distance (in miles).

Figure 3: Final path model for meeting duration and distance to meeting location

A: Age of the respondent

G: Gender (1 = Male, 0 = Female)

H_{12}: Household includes children under 12 (1 = yes, 0 otherwise)

O: Meeting took place outside of a residence (respondent's or alter's)(1 = yes, 0 = no)

O_r: Meeting took place outside of respondent's home (1 = yes, 0 = no)

C: The nature of the relationship (close contact vs. distant contact). Close relationships are those identified as family and close friend. (close = 1, otherwise = 0)

W: Weekend (1 = yes)

F: Person telecommutes to work (1 = yes)

C_{p3}: Proportion of close contacts that live within 3 miles of respondent's home exceeds 5% (1=Yes, 0=No)

S: Distance of residence from downtown Minneapolis (in miles).

The final model differs from the proposed model in that, there is no effect of leisure purpose on duration or distance. In addition, there was no effect of total number of reported meetings on the duration or distance of each individual meeting. Some paths have also been removed since they impact only one of the two variables. The final model and its goodness of fit measures are summarized in Table 6. The chi-squared measure in the results table tests the overall fit of the path model by comparing the covariance matrix from the estimated model with the observed data. These tests are done for both the null model and the final model. A large p-value is evidence that the estimated covariance in the model closely resembles the

observed relationships (shows failure to find a statistical difference). The estimated model provides a significant improvement over the null model. Values of 0.9 and above in the comparative fit index and non-normed fit indices (CFI and TLI) indicate that the model provides an acceptable fit. The estimates for the model are 0.996 and 0.976.

Table 7 summarizes the overall and indirect effects of the exogenous and endogenous variables in our model on meeting duration and home to meeting distance. Overall effects account for indirect effects of the exogenous variables through their mediation of meeting duration in this model. For instance the overall effect of a meeting with a close relationship is the effect it would have on meeting duration and the consequent effect meeting duration would have on distance travelled (0.718 * 0.693 = 0.498). A close contacts overall effect on meeting distance then is the sum of the direct effect and indirect effect: we expect a respondent to travel an additional 1.5 miles (2.4 km) to meet close contacts. In part that is because meetings with closer contacts are longer, and for longer duration meetings, people travel further. In part, that is because there is a general willingness to travel the additional distance to meet with a close contact. The overall and indirect effects for each of the variables in our structural model is given in Table 7 .

The R^2 values for the duration and meeting distance models in table indicate the amount of variance that is accounted for by the direct paths. These values suggest that even though the variables included in the model capture important trends in the data, there is still a significant amount of variance left in the model to address. This is a pattern we anticipated given the significant flexibility of social meetings. The R^2 value for duration 0.135 and that for distance is 0.264. But this is expected as meeting decisions are also affected by the meeting parties that are not included in this analysis, and can also easily be influenced by personal idiosyncrasies that are difficult to capture based on observed variables. Below we summarize the results by groups of variables.

Purpose: In the path analysis, meeting purpose was not found to be a significant contributor to meeting duration or distance travelled. As a result, this variable was dropped from the model. On the other hand, we had earlier found that in-home meetings tended to be influenced by purpose - particularly leisure purpose. Even when the out-of-home variables are dropped, the effect of leisure purpose in the model is insignificant, suggesting people don't have a specific pattern of relating durations or distances from their home on account of purpose categories as described here.

Relationship: Relationship plays an important role in both meeting duration and distance travelled. As can be seen in Table 7, meetings reported with close contacts were 0.72 hours longer and 1.51 miles (2.4 km) further than meetings with other contacts. The second relationship related variable, whether a person lives within 3 miles (4.8 km) of 5% or more of their closest contacts, is also important for both meeting duration and distances. This variable is suggestive of the tendency of the individual to prioritize close contact proximity in location choice. We find people who have 5% or more of their contacts close by tended to report longer duration meetings (0.43 hours) and tended to travel about 1 mile (1.6 km)

less for meetings.

Personal and household preferences and constraints: We find both age and gender are important in explaining duration and distance. Older age is associated with shorter duration and shorter meeting duration overall. Men were more likely to report longer meetings and shorter distances, but the effect of gender was only significant at the 0.10 level. Earlier, we noted that neither age or gender were significantly associated with in-home meeting decisions. The presence of children under 12 in a household was an important factor not only in the decision to hold meetings in-home, but also on duration of meetings and distance travelled. Those with children under 12 had meetings that were shorter by 0.6 hours and travelled 0.4 mile (0.65 km) shorter distances.

Telecommuting, which is indicative of some flexibility from work, is important in influencing distance but did not have an effect on meeting duration. Telecommuters reported a meeting location that was on average 1 mile (1.61 km) further from their home as compared to non-telecommuters. The relaxation of the work constraint on weekends is also important in influencing duration and distance. Weekend meeting durations are on average longer by 0.35 hours and distances are longer by about 1.73 miles (2.78 km). It is possible that this variable is endogenous and people may plan their longer duration and longer distance meetings to weekends.

Location attributes: Meetings outside of the respondent's home were 9.5 miles (15.3 km) away. Depending on duration, age, sex, and other factors, these distances are modified. When meetings occur outside or a residence, they tended to be shorter (-.6 hours) and closer to the respondents home (-0.42 miles/-0.68 km). Persons who reside further from the downtown Minneapolis have longer duration and longer distances. For each mile away from downtown Minneapolis, meeting duration reduces by 0.05 hours and distance of meeting location from residence increases by 0.22 miles (0.35 km). Those in more suburban environments then do tend to have longer meetings, but they also have to travel longer for those meetings indicating either a significant separation from other contacts or from places that are convenient locations as meeting venues with their social contacts.

Interdependence between duration, distance, and other meetings: As we had discussed in Section 3, we anticipate that duration will have a direct effect on distance. Since meetings tend to be preplanned, we anticipate that travelers would choose to accept certain distances based on the expected duration of the meeting. A reversal of the relationship to point from distance to duration leads to a much weaker overall model. The impact of duration is to increase distance by 0.7 miles (1.13 km) for each hour of meeting length. On the other hand, our assumption that total number of meetings would have a moderating impact on duration of meetings or distance travelled, was not supported by the model. This variable was dropped from the analysis as it had no impact on the duration or distance travelled.

6 Summary

Social interactions are key to human life. These interactions are part of our activities to produce, trade, solve problems, get emotional support, relax. The need for interaction creates a demand for travel. While communication technologies have bridged the space gap by allowing people to communicate in real time, they have not yet replaced the need for face-to-face meetings. The data collected here for instance shows people having up to 15 face-to-face scheduled meetings within a 7 day period, whose durations and purposes vary. As others have pointed out, technology (including transportation technologies) may in fact have helped along the spatial dispersion of contacts, leading to longer travel whenever face-to-face meetings are to occur.

We started by discussing that social meetings had fewer constraints as compared to work or other types of trips and more complexity on account of the different parties involved. As such, the lack of structure would make it more difficult to capture the differences in meeting attributes using just socio-demographic variables. We posited that purpose, relationship, personal, household and other constraints, as well as the peculiarities of the meetings themselves and interactions with other meetings were likely the variables that would explain, to the extent possible, the variety of meetings we encounter. In this paper, we are particularly interested in the duration of meetings and the distance individual are willing to engage in those meetings relative to their residence. We, however, also argue that a distance of zero (an in-home meeting) is not part of a continuum of distances from home. We thus estimate two models —one for a dichotomous decision to have the meeting inside a residence or outside of a residence, and a second to measure the direct and indirect effects of different variables including purpose, relationship, personal and household constraints, and meeting attributes.

Respondents in our survey had a mix of in-home and out-of-home meetings. Given a location is out-of-home, the largest positive overall impact on distance to meeting location is whether the meeting occurs on a weekend. This is closely followed by whether the person being met is a close contact, and the third effect is whether the person telecommutes. Each of these have the average impact of increasing meeting distance by 1.7 miles, 1.5 miles, and 1.05 miles (2.7 km, 2.4 km, and 1.7 km) respectively, all other things equal. Meeting duration also increased distance, adding 0.7 miles (1.12 km) for each additional hour of meeting. Variables that have the largest reductions on distance are whether the person lives close to 5% or more of their closest contacts, gender, presence of children, and whether the meeting is a non-residential meeting.

The largest positive impacts on duration are a result of meeting a close relation, living close to close relations, a weekend meeting, and gender. The largest negative impacts are a result of having children in the home and meetings occurring outside of a residence. Age as well as distance to downtown also have moderate but statistically significant impacts on duration.

We find the structural model we estimated fits the data reasonably well, reproducing a covariance matrix that is not significantly different from the saturated model. While the regression R^2 values for the models show a moderate goodness of fit, we think this arises from the significant flexibility of social meetings. The fact that attributes related to contacts (C and C_{p3}) have some of the largest impacts in moderating social meeting location and duration highlights the importance of such variables in contexts where one seeks to understand the factors affecting time-use or travel decisions. On the other hand, we also find that each meeting episode seems uninfluenced by the number of other meetings over the course of a week at least in terms of duration and the meeting location's distance from home.

From a policy perspective, the findings here highlight that agencies collecting travel behavior data would be well served to gather some social network related information from their respondents. We note that in our data nearly a third of meetings took place at a residence. Also, at the individual relationship level, we observe that tie strength is an important part of the in-home/out-of-home location choice decision for social meetings. These travel outcomes depend on the spatial distribution of people's social networks and particularly on where close-contacts reside. We also find that those who have more of their close contacts living near them tend to have shorter travel and longer meetings, and that relationship closeness affects both time allocation and distance travelled for meetings. Data that adds to knowledge of the spatial distribution of the social networks of respondents and to the pattern of with whom meetings take place (e.g. tie strength) can further our understanding of social activity travel behavior.

References

Arentze, T. and Timmermans, H. (2008). Social networks, social interactions, and activity-travel behavior: a framework for microsimulation. *Environment and Planning B: Planning and Design*.

Arentze, T., van den Berg, P., Timmermans, H., et al. (2012). Modeling social networks in geographic space: approach and empirical application. *Environment and Planning-Part A*, 44(5):1101.

Axhausen, K. (2002). A dynamic understanding of travel demand: A sketch. *Arbeitsberichte Verkehrs-und Raumplanung*, 119.

Carrasco, J., Hogan, B., and Wellman, B. (2008). Agency in social activity interactions: The role of social networks in time and space. *Tijdschrift voor Economische en Sociale Geografie*.

Costa, D. L. and Kahn, M. E. (2001). Understanding the decline in social capital, 1952-1998. Technical report, National Bureau of Economic Research.

Dijst, M. (2009). "ICT and social networks towards a situational perspective on the interaction between corporeal and connected presence". *The Expanding Sphere of Travel Behaviour Research Ed. R Kitamura (Emerald, New York) forthcoming*.

Ettema, D., Arentze, T., and Timmermans, H. (2011). Social influences on household location, mobility and activity choice in integrated micro-simulation models. *Transportation Research Part A: Policy and Practice*, 45(4):283–295.

Frei, A. and Axhausen, K. (2009). Modelling the frequency of contacts in a shrunken world. *Working Paper*.

Golob, T. (2003). Structural equation modeling for travel behavior research. *Transportation Research Part B*.

Habib, K., Carrasco, J., and Miller, E. (2008). The social context of activity-scheduling: A discrete-continuous model of the relationship between with whom and episode start time and duration. *Transportation Research Record: Journal of the Transportation Research Board*.

Hackney, J. K. and Axhausen, K. W. (2006). An agent model of social network and travel behavior interdependence. In *11th International Conference on Travel Behaviour Research. Kyoto*.

Hagerstrand, T. (1970). What about people in regional science. *Papers of the Regional Science Association*, 24:7–21.

Harvey, A. and Taylor, M. (2000). Activity settings and travel behaviour: A social contact perspective. *Transportation*.

Hill, R. A. and Dunbar, R. I. (2003). Social network size in humans. *Human nature*, 14(1):53–72.

Illenberger, J., Nagel, K., and Flötteröd, G. (2013). The role of spatial interaction in social networks. *Networks and Spatial Economics*, 13(3):255–282.

Kowald, M., van den Berg, P., Frei, A., Carrasco, J.-A., Arentze, T., Axhausen, K., Mok, D., Timmermans, H., and Wellman, B. (2013). Distance patterns of personal networks in four countries: a comparative study. *Journal of Transport Geography*, 31:236–248.

Larsen, J., Axhausen, K. W., and Urry, J. (2006). Geographies of social networks: meetings, travel and communications. *Mobilities*, 1(2):261–283.

Larsen, J., Urry, J., and Axhausen, K. W. (2007). Networks and tourism: Mobile social life. *Annals of Tourism Research*, 34(1):244–262.

Miller, H. (2005). Necessary space- time conditions for human interaction. *Environ. Plann. B*, 32(3):381–401.

Miller, M. (1977). Potentials and pitfalls of path analysis: A tutorial summary. *Quality and Quantity*.

Mok, D., Wellman, B., and Basu, R. (2007). Did distance matter before the internet? interpersonal contact and support in the 1970s. *Social networks*.

Ohnmacht, T., Götz, K., and Schad, H. (2009). Leisure mobility styles in swiss conurbations: construction and empirical analysis. *Transportation*.

Páez, A. and Scott, D. (2007). Social influence on travel behavior: a simulation example of the decision to telecommute. *Environment and Planning A*.

Santos, A., McGuckin, N., Nakamoto, H. Y., Gray, D., and Liss, S. (2011). Summary of travel trends: 2009 national household travel survey. Technical report, Federal Highway Adminstration, USDOT.

Schwanen, T. and Dijst, M. (2002). Travel-time ratios for visits to the workplace: the relationship between commuting time and work duration. *Transportation Research Part A: Policy and Practice*, 36(7):573–592.

StataCorp (2015). *Stata Statistical Software: Release 14*. StataCorp LP, College Station, TX:.

Tilahun, N. (2010). *Matching Home and Work: Job search, contacts, and travel*. PhD thesis, University of Minnesota.

Tilahun, N. and Li, M. (2015). Geography of close contacts and face-to-face meetings. In *Transportation Research Board 94th Annual Meeting*, number 15-5591.

Tillema, T., Dijst, M., and Schwanen, T. (2010). Face-to-face and electronic communications

in maintaining social networks: the influence of geographical and relational distance and of information content. *new media & society*, 12(6):965–983.

Urry, J. (2003). Social networks, travel and talk. *British Journal of Sociology*, 54(2):155–175.

Wellman, B. (1979). The community question: The intimate networks of east yorkers. *American Journal of Sociology*.

Wellman, B. and Wortley, S. (1990). Different strokes from different folks: Community ties and social support. *American journal of Sociology*, pages 558–588.

Table 6: Estimated model for home to meeting distance and meeting duration

		Coefficient	Std. Err.	z	$P > \|z\|$
Meeting duration (T_{mt})					
Age	A	-0.012	0.006	-1.99	0.046
Gender	G	0.228	0.133	1.71	0.088
Household w. children under 12	H_{12}	-0.606	0.137	-4.41	0.000
Out-of-home meeting	O	-0.602	0.137	-4.38	0.000
Close contact	C	0.718	0.131	5.49	0.000
Weekend	W	0.354	0.131	2.7	0.007
% contacts in 3 miles	C_{p3}	0.436	0.142	3.07	0.002
Home dist. to downtown	S	0.047	0.017	2.75	0.006
Intercept		2.225	0.303	7.35	0.000
Error Variance		2.604	0.140		
$R^2 =$		0.135			
Distance to meeting (D_{mt})					
Meeting duration	T_{mt}	0.693	0.139	4.98	0.000
Age	A	-0.098	0.022	-4.56	0.000
Gender	G	-1.076	0.499	-2.16	0.031
Out of respondents home	O_r	9.489	0.698	13.6	0.000
Telecomutes	F	1.047	0.505	2.07	0.038
Close contact	C	1.012	0.499	2.03	0.042
Weekend	W	1.487	0.485	3.07	0.002
% contacts in 3 miles	C_{p3}	-1.282	0.521	-2.46	0.014
Home dist. to downtown	S	0.184	0.064	2.89	0.004
Intercept		-0.457	1.274	-0.36	0.720
Error Variance		36.084	1.941		
R^2		0.264			
Goodness of fit measures for the path model					
Likelihood ratio		χ^2	df	p	
Model vs. saturated		5.32	4	0.256	
Baseline vs. saturated		315.18	21	0.000	
Comparative fit index	CFI	0.996			
Tucker-Lewis Index	TLI	0.976			
Coefficient of determination		0.351			

Table 7: Total and indirect effects of model variables on meeting distance and duration

| Variable | Description | Total effects | | | | Indirect effects | |
| | | Duration (T_{mt}) | | Distance (D_{mt}) | | Distance (D_{mt}) | |
		Coef.	p-value	Coef.	p-value	Coef.	p-value
T_{mt}	Meeting duration	-	-	0.693	0.000	-	-
A	Age	-0.012	0.046	-0.106	0.000	-0.008	0.064
G	Gender	0.228	0.088	-0.918	0.07	0.158	0.106
H_{12}	Children under 12	-0.606	0.000	-0.419	0.001	-0.419	0.001
O	Out-of-home	-0.602	0.000	-0.417	0.001	-0.417	0.001
O_r	Outside resp. home	-	-	9.489	0.000	-	-
F	Telecommutes	-	-	1.047	0.038	-	-
C	Close contact	0.718	0.000	1.51	0.002	0.498	0.000
W	Weekend	0.354	0.007	1.732	0.000	0.245	0.018
C_{p3}	% close ctct 3mi > 5%	0.436	0.002	-0.98	0.064	0.302	0.009
D	Distance to down town	0.047	0.006	0.217	0.001	0.033	0.016