

Project Report

Exploration of the Relationships between Leisure Activity Participation Frequency and Social Capital

Prepared for Teaching Old Models New Tricks (TOMNET) Transportation Center



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June 2022

TECHNICAL REPORT DOCUMENTATION PAGE

1. Report No. N/A	2. Government Accession No. N/A	3. Recipient's Catalog No. N/A	
4. Title and Subtitle Exploration of the Relationships between Leisure Activity Participation Frequency and Social Capital		5. Report Date June 2022	
		6. Performing Organization Code N/A	
7. Author(s) Trang Luong, https://orcid.org/0000-0002-4233-1532 Michael Maness, https://orcid.org/0000-0001-5780-8666		8. Performing Organization Report No. N/A	
9. Performing Organization Name and Address University of South Florida, 4202 E. Fowler Avenue, Tampa, FL 33620		10. Work Unit No. (TRAIS) N/A	
		11. Contract or Grant No. 69A3551747116	
12. Sponsoring Agency Name and Address U.S. Department of Transportation, University Transportation Centers Program, 1200 New Jersey Ave, SE, Washington, DC 20590		13. Type of Report and Period Covered Research Report (April 2021 – September 2022)	
		14. Sponsoring Agency Code USDOT OST-R	
15. Supplementary Notes N/A			
16. Abstract This study examines the effects of social capital on the frequency of leisure activity participation. Two retrospective surveys of activity behavior were completed in Fall 2019 and 2020. The surveys included questions to ascertain individuals' instrumental and expressive social capital through position, resource, and generalized name generators. Respondents were asked about participation across a vast list of specific leisure activities over the previous three months. Respondents with greater expressive social capital participated in social leisure activities more frequently than those with less expressive social capital. This relationship was found to not hold for the activities: drinking and socializing, attending church, and dining out.			
17. Key Words Network Capital, Social Support, Discretionary Travel, Social Network, Social Activity, Hobbies		18. Distribution Statement No restrictions.	
19. Security Classif.(of this report) Unclassified	20. Security Classif.(of this page) Unclassified	21. No. of Pages 77	22. Price N/A

Form DOT F 1700.7 (8-72)

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ACKNOWLEDGMENTS

This study was funded by grant number 69A3551747116 from A USDOT Tier 1 University Transportation Center, supported by USDOT through the University Transportation Centers program. The authors would like to thank the TOMNET, USDOT, and the Dwight David Eisenhower Transportation Fellowship Program for their support of university-based research in transportation, and especially for the funding provided in support of this project. The authors would like to thank Fred Mannering and Mark S. Hancock for their contributions to the work presented in this report.

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EXECUTIVE SUMMARY

Transportation has recently become an umbrella name that no longer refers only to improving congestion or increasing public transit use, but it has also started to include research relating to human behavior, health, as well as human interactions with the built environment and each other. The need to travel is dictated by the need to connect with activities such as employment and entertainment as well as the people who belong to one's formal and informal social networks. Recently, there has been an increased focus to study how the need to travel fits into the context of one's social capital and relates to participation in various leisure activities. Because activity-oriented approaches have gained considerable attention in the field of travel behavior and the methodology to study them was expanded to not only explore the activity type but also incorporate its timing and duration jointly, increased focus on leisure activities in the literature has been observed.

This study examines the effects of social capital on the frequency of leisure activity participation. This research proposed two research questions to test the two dimensions of social capital on the leisure activity participation frequency outcome:

1. Does expressive support play a more significant role than instrumental support in increasing the participation frequency of leisure activities, thus suggesting that activity frequency is an expressive outcome as people maintain and strengthen their social connections?
2. How sensitive are the instrumental and expressive social capital measures on the participation frequency of different forms of leisure activities?

This study aims to answer those questions using insights gathered from a self-administered web-based survey designed specifically to measure differences in social capital and its relevance in a leisure activity context.

Two retrospective surveys of activity behavior were completed in Fall 2019 and 2020. The surveys included questions to ascertain individuals' instrumental and expressive social capital through position, resource, and generalized name generators. Respondents were asked about participation across a vast list of specific leisure activities over the previous three months. The survey was administered online using non-probability online panels including Qualtrics Panels, MechanicalTurk, and Prolific.

The analysis in this report covers the Fall 2019 survey. The twenty most commonly participated activities were analyzed. Activity participation was measured using an ordered frequency list ranging across the categories: zero, once (over the last three months), twice, monthly, two to three times monthly, weekly, and more than once weekly. To account for an inflated zero frequency as well as two different types of "not participated" – temporary versus sempiternal – a zero-inflated ordered probit model (ZIOP) was used. Twenty independent ZIOP models were estimated – one for each activity. As the activities varied in sociability, it was expected that more social activity would more likely having frequency behavior dependent on expressive social capital. This result was mostly found to be true; respondents with greater expressive social capital participated in social leisure activities more frequently than those with less expressive social capital. This relationship was found to not hold for the activities: drinking and socializing, attending church, and dining out. This may be due to poor health and well-being outcomes, scheduling constraints, and substitutability of dining with other activities, respectively.

INTRODUCTION

The need to travel is a derived demand to complete activities such as employment, entertainment, and to interact with one's formal and informal social networks. There have been more studies on how the need to travel fits into the context of one's social capital and relates to participation in various leisure activities (Mannering, 2019). Because the activity-oriented methodological advancement has gained considerable attention in the field of travel behavior (Axhausen and Gärling, 1992), an increased focus on different type of leisure activities was observed (Bowman and Ben-Akiva, 2001; Ettema et al., 2007).

Carrasco and Miller (2009) found that social network characteristics help explain social activity travel generation. Kim et al. (2018) reviewed transportation studies that analyzed impacts of individuals' social networks on the frequency of social activity participation across three measures:

Network size: more frequent activity participation was associated with larger networks,

Relationship type: no clear consensus due to varying methodologies and classifications,

Tie strength: higher social activity frequency was generated by stronger ties.

This study examines the effects of social capital on the increased frequency of leisure activity participation. It is hypothesized that leisure activity frequency is an expressive outcome of social capital which is used by people to maintain and strengthen their social connections. This research proposes three research questions to test the two dimensions of social capital on the leisure activity participation frequency outcome:

1. Do individuals with higher levels of expressive support participate in particular activities more often than others with lower levels of expressive support?
2. Are the activities performed more frequently by individuals with higher expressive support more social in nature?
3. Does instrumental support have no effect on activity frequency for social activities?

This study aims to answer those questions using insights gathered from a self-administered web-based survey designed specifically to test differences in social capital and its relevance in a leisure activity context.

Activity frequency as expressive returns of social capital

The concept of social capital describes how individuals acquire beneficial assets and services through social interactions. Häuberer's (2011) schema clarifies Lin's theory and provides causal relationships between preconditions, social capital, and outcomes (Figure 1). Individuals are preconditioned in a societal context and have access to individually owned resources and assets. Access to social resources is mobilized through social networks and their structural properties. Smaller, denser networks help maintain social connections and promote continued access to group resources through trust and reciprocation. This leads to more resources for expressive actions and subsequently, capitalization of expressive outcomes. Lin (2001) classifies expressive outcomes as mental health, physical health, and life satisfaction.

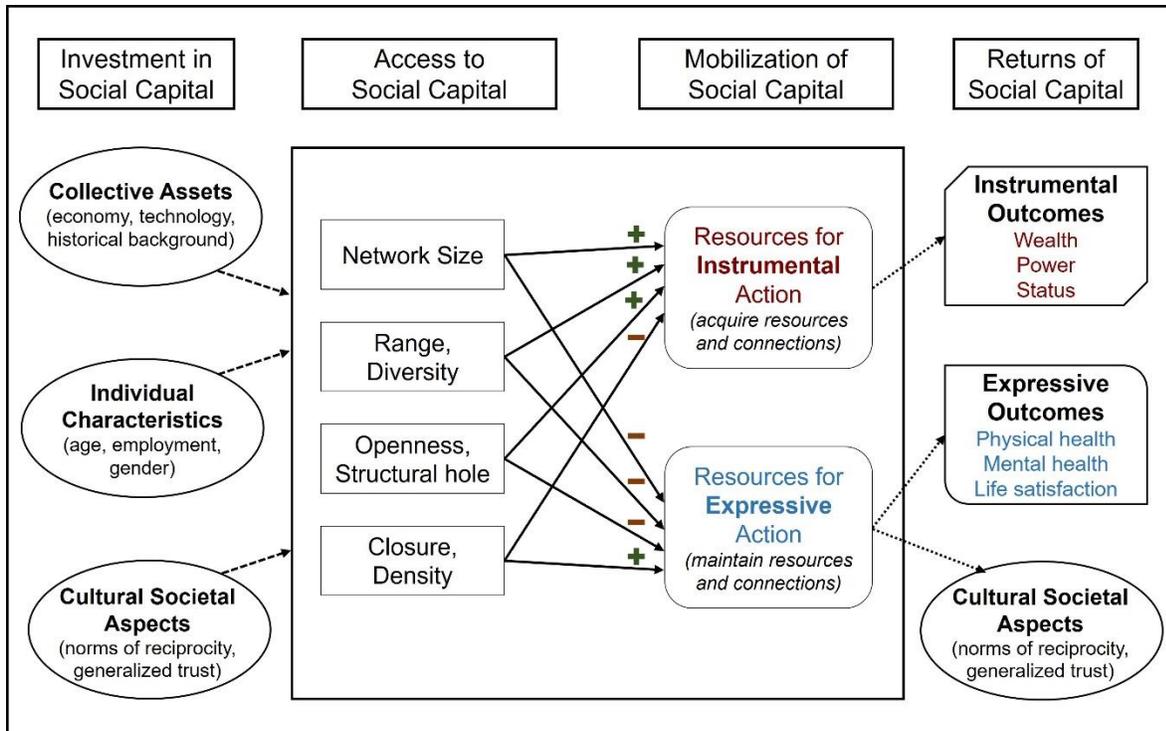


Figure 1. Conceptual diagram of social capital – adapted from Häuberer (2011)

To operationalize Lin’s conception of social capital as socially embedded resources in an activity-travel context, activity behavior is described as outcomes (i.e., the returns of social capital). Resources for expressive actions can provide expressive support by aiding in maintaining social ties and building closer relations. Closer relations are built through trust and reciprocity which are gained through shared participation (Kadushin 2012). For those individuals with greater expressive resource access, more time must be devoted to an individual’s stronger ties, and this induces more frequent interaction with these strong ties. Thus, it could be expected that people with greater access to expressive resources would have higher social leisure activity frequency than those with less access. Exploring the potential for social leisure activity frequency to be described as an expressive outcome is the focus of this study.

LITERATURE REVIEW

Taxonomy

Historically, the measurement of interests has focused on identifying vocational or occupational interests. The first interest inventories were developed in the early 1900s (Hansen and Scullard, 2002). Although the field of study of human professional and leisure preferences is over a century long, the more direct attention and growth of knowledge in the area of social capital, leisure activities, and their broader consequences are rather new. Warde and colleagues (2005) stated that there is a lack of theoretical clarity about how informal recreational practices generate social engagement and participation. They found that there is clear evidence that people’s personal networks make a significant difference to their informal sociability.

As the study of leisure activity evolves, there has been focus placed on the classification of leisure activities itself. Since the leisure activities could be grouped by different driving parameters, there is no clear consensus among researchers on how to categorize them. Tinsley and Eldredge

(1995) designed a taxonomy of leisure activities based on their need-gratifying properties from the Paragraphs About Leisure (PAL) scale. This PAL scale was developed to distinguish 11 psychological benefits acquired from 82 leisure activities. Based on a participants' rating, each leisure activity has varying scores on these psychological needs for exertion, affiliation, enhancement, self-expression, nurturance, compensation, sensibility, conscientiousness, status, challenge, and hedonism. With a strong reliability score of 0.96, the visiting friends and relatives activity, for example, has low or moderate scores for exertion (44), enhancement (40), self-expression (55), compensation (52), sensibility (57), and challenge (43); but high scores for affiliation (72), nurturance (72), conscientiousness (62), and status (70). As stated in this research's second hypothesis on the frequency of leisure activities that are social in nature, the range of affiliation score (as described in Tinsley and Eldredge (1995) as the fulfillment of the need to be around others in an enjoyable and cooperative setting rather than to be alone) is employed in this study to classify the level of sociability for each activity.

As mandatory and leisure activities are quite distinct, some researchers recognized the need to categorize the activities based on their functions, such as mandatory work (paid job, school, etc.), household work and maintenance, and leisure activities (social, entertainment exercising, etc.) (Akar et al., 2011; Bhat and Lockwood, 2004; Bhat and Gossen, 2004; Kemperman et al.) Findings from the literature suggest that leisure activity taxonomy varies across disciplines and can be very context specific leaving the researchers relative flexibility in designing subject specific studies and interpreting the results.

Leisure activities, social capital, and transportation

Akar et al. (2012) argued that from a transportation point of view, it is critical to find the attributes of activities that make them unique as they may have significant impacts on travel. For instance, the location and duration of the activity could be key determinants of related transportation patterns. Although, not strictly focused on leisure activities since the authors also looked into household and work-related tasks, Akar et al. (2012) did offer new insights into the body of knowledge on leisure activities. They found that gender had significant effects on activity choice and female respondents were more likely to participate in out-of-home pre-planned leisure activities and leisure activities that were flexible in time and space. Older adults who were at least 55 years old were found to be more likely to participate in in-home leisure activities which were fixed in time, planned in advance, or as part of a routine. Younger individuals were more likely to participate in all groups of leisure activities as compared to the base case: in-home leisure, planned in advance or as part of a routine.

Parady et al. (2019) surveyed the number of leisure activities engaged in over the last two weeks to derive the leisure propensity construct based on leisure shopping, eating out, and other leisure activity frequency. Using multilevel structural models, their study found direct and positive effects of Japanese respondents' network size, club membership, income, and urbanization level on leisure propensity.

Participation in leisure activities was also found to be reflected and determined by personality traits (Kandler and Piepenburg, 2020), which extends previous findings on the reciprocal links between personality traits and leisure interests and engagements (Wille and De Fruyt, 2014). Consequently, the motivational perspective including leisure interests needs to be considered in a comprehensive model, analysis of personality, and socio-demographic factors as all of the above contribute to creating one's social capital that is defined by Glover and Hemingway (2005) (based on the theory of Pierre Bourdieu) by persistent social ties that enable group to constitute, maintain, and

reproduce itself. Those ties lead to cultivating boundaries through mutual recognition and obligation. Another value of social capital is the access to resources that come in a form of information or monetary benefits and that are held by others in the same group. Tilahun and Li (2015) found correlations between the face-to-face meeting frequency of strong ties and an individual's age and gender (and differences between individuals and their strong ties).

Maness (2016) combined the theories of strong and weak ties, social capital with travel behavior and found different impacts across individual, household, and social network characteristics. Independent variables such as level of education or relationship status were found to play a role in leisure activity frequency. Age, gender, and race become statistically significant. The same author also found support for the hypothesis of weak tie diversity increasing activity frequency however the model provided weak support for the hypothesis that the number of strong ties increased activity frequency.

Influence of social network characteristics on social activity participation

Gathering evidence of the linkage between social networks and activity generation, Kim et al. (2018) reviewed transportation studies that analyzed the impacts of individuals' social network characteristics on the frequency or propensity of social activity participation across three measures: (1) Network size, (2) Relationship type, and (3) Tie strength. Regarding network size, more frequent activity participation was associated with larger networks. Regarding relationship type, there was no clear consensus on its impact on ego-alter activity frequency due to varying methodologies and classification schemes. Regarding tie strength, several studies asked specifically about whether respondents had strong, medium, or weak ties with their alters. Each study found that higher social activity frequency was generated by stronger ties.

Van den Berg, Arentze, and Timmermans (2010) reported an average of 2.8 of face-to-face social interactions per day that include joint activities or visits. After accounting for the individual and household characteristics in Poisson regression, they observed a larger effect of very strong ties compared to the effect of reasonably strong ties in generating more face-to-face social interactions. While examining structured leisure that are a part of clubs or volunteer organizations, Van den Berg, Arentze, and Timmermans (2012) found endogenous effects between the increased number of social ties and club memberships or more frequent volunteering activities.

Carrasco and Miller (2009) explicitly asked respondents about the frequency of performing social activities such as hosting, visiting, or dining out with each alter. They observed an increased in social activity frequency for individuals with closer alters, higher number of disconnected subgroups in the network, and alters with more direct connections with other network members. Accounting for the dynamic changes of face-to-face interactions after a life-cycle event, Sharmeen, Arentze, and Timmermans (2014)'s findings on tie strength impact are still consistent with previous studies that strong ties have stronger and positive effects on increased face-to-face interaction frequency compared to medium or weak ties. Their detailed survey on alters reveal that individuals have more interactions with alters who are similar in gender, education level and living distance across different age groups.

RETROSPECTIVE SURVEY OF SOCIAL CAPITAL AND LEISURE ACTIVITY

In order to examine the correlations between social capital and leisure activity outcome, a focus cross-section survey questionnaire was developed to comprehensively capture the typology of individual's activity participation and explanatory factors of interests. The survey first was administered in late 2019 and added more well-being, pandemic impacts measures for the survey

distributed in late 2020. Subsequent sections describe all components of the survey questionnaire.

Activity space

The activity space section of the survey asked about: (1) leisure activity variety and frequency, (2) household mandatory and maintenance activities, and (3) work and school demand.

Leisure activity variety and frequency

Survey respondents were presented an activity list and asked to choose the specific activities they participated in over the last three months. Leisure activity variety was asked over a list of 86 unique activity types. Adopted from Tinsley and Eldredge (1995), 77 out of their 82 activities were adopted – with arcade games, collecting bottles, shortwave radio listening, volunteering for crisis intervention, and watching television excluded due to being outdated, dependent on specific crisis events, or overabundance. Nine additional leisure activities were added including: attending festivals and parades, board gaming, joyriding, gambling, gardening in community gardens, softball, singing karaoke, video games, and visiting amusement/theme parks. The list of 86 activities was presented across four pages. Activities that are similar, (e.g., hiking and backpacking) were placed adjacent to reduce the likelihood of inaccurate counts.

After participants chose the leisure activities they conducted over a three-month period, they were presented with a short list of those selected activities to indicate the participation frequency for each of the activities using six choice categories: once, twice, once per month, 2-3 times per month, once per week, more than once per week.

Household mandatory and maintenance activities

As leisure activity participation, being of discretionary and voluntary nature, is constrained by the time available to an individual after their mandatory and maintenance tasks. Thus, the time spent on household mandatory and maintenance activities in a week was asked to account for the time budget utilization. Respondents were asked “Over the last week, how many hours did you devote to each of the following activities in your household? (If you participated in an activity but it was less than one hour, please write 1).” The following tasks were presented to the respondents: housework and chores, food preparation and cleanup, lawn and garden care, paying bills and other household paperwork, grocery shopping, other shopping for the household, caring for children in your household, caring for children from other households, caring for adults in your household, caring for adults from other households.

Work and school demand

Employment status was asked. Respondents reported as being employed full-time or part-time were further asked about the number of hours they spent working for a job over the last week. Respondents reported as being students (and not employed for pay) were further asked about the number of hours they spent attending school over the last week? School hours were specified as the time spent on campus, in educational building or online course content, not including the travel time to/from school.

Social capital questionnaire

Social capital was measured through three instruments: (1) position generator, (2) resource generator, and (3) generalized name generator. These three instruments directly and indirectly measure social resource access.

Position generator

To maintain comparability with the 2009 Pew Internet Personal Networks and Community Survey described in Hampton et al. (2009), a list of 22 occupations for the position generator was applied in this study to measure access to instrumental social resources. Respondents were asked to indicate if they personally knew someone (a relative, friend, or acquaintance) on a first-name basis with that occupation. Each occupation has a prestige score determined by the Standard International Occupational Prestige Scale (SIOPS) that were later used to calculate each occupation's prestige status (Lin & Ao, 2008). The list of occupations is reported in decreasing order of prestige score (in parentheses) but was presented to respondents randomly ordered:

1. Professor (78)
2. Lawyer (73)
3. Chief executive officer (70)
4. Congressman or congresswoman (64)
5. Production manager (63)
6. Middle school teacher (60)
7. Personnel manager (60)
8. Writer (58)
9. Nurse (54)
10. Computer programmer (51)
11. Administrative assistant in a large company (49)
12. Bookkeeper (49)
13. Police officer (40)
14. Farmer (38)
15. Receptionist (38)
16. Operator in a factory (34)
17. Hairdresser (32)
18. Taxi driver (31)
19. Security guard (30)
20. Full-time babysitter or nanny (23)
21. Janitor (21)
22. Hotel bellhop (20)

Resource generator

In order to explore the availability of resources that individuals can access through their social network, a resource generator was included in the questionnaire. Respondents were told: "This section is about who you would turn to for help, if you needed it, in different situations. For each situation, please choose who you would turn to first for help. (If there are several people you are equally likely to turn to, please choose the one who you feel is closest to you)." Respondents were presented with seven choices of social network members for each item: immediate family, other family member, close friend, neighbor, someone I work/study with, other friend or acquaintance, and no one. This 26-item resource generator was developed by refining resource generators from Joye and colleagues (2019) and Foster and Mass (2016). Nine instrumental resources were asked in this refined resource generator:

1. Help you if you needed to borrow a large sum of money
2. Help you with finding a job
3. Help you with finding a new place to live

4. Help you if you needed advice on administrative formalities and on other legal matters
5. Discuss politics
6. Is an elected official
7. Has good contacts at TV/radio/newspaper
8. Knows a lot about government regulations
9. Works at a local government agency

Additionally, sixteen expressive resources were included in the resource generator:

1. Help you for a household or a garden job that you can't do yourself
2. Help you around the house if you were sick and had to stay in bed for a few days
3. Help you if you had problems with your computer that you cannot solve yourself
4. Help you look for information about a serious personal health issue
5. Be there if you felt a bit down or depressed and wanted to talk about it
6. Be there if you just wanted to talk about your day
7. Make you feel appreciated for who you really are
8. Pick you up from a social event in the evening
9. Look after you if you were seriously ill
10. Do your shopping if you are ill
11. Provide you a place to stay for a week
12. Give advice on problems at work
13. Give advice about money problems
14. Give advice on family problems
15. Can babysit others' children
16. Watch your home or pets while away

Generalized name generator

To additionally quantify the level of expressive support, respondents were asked: "From time to time, most people discuss important matters with other people. Looking back over the last three months, think about the people whom you discussed matters that are important to you. How many people were you able to recall?" This question was a generalized version of Burt's name generator in the General Social Survey (Burt 1984). Respondents were presented with eleven choices from 0 through 9 and 9 "10 or more". Although less precise due to left censoring, the multiple-choice option was utilized to reduce survey burden.

Mobility/accessibility

Previous study (Maness, 2017) had explored the correlations of the position generator and eight different leisure activities. However, the lack of mobility data limited the model interpretation as transportation options play a crucial role in enhancing out-of-home activity participation. Thus, the survey included standard questions on driver's license attainment, presence of a disability, condition, or illness that affects one's ability to travel within region, bicycle, ridehailing services, and transit usage frequencies. Self-reported workers and students were also asked about the mode and duration of their commute to work or school.

Accessibility options were also measured by the number of available household motorized vehicles (including four-wheelers and two-wheelers). The accessibility around a respondent's home was approximated by the time it would take him/her to walk or drive to the closest sit-down restaurant.

Individual and household characteristics

Standard questions used in the Census survey were asked about an individual's sociodemographics including: age, education, income, race/ethnicity, and marital status. As personalities can influence one's leisure activity participation choices, five main personality traits—extraversion, openness to experience, agreeableness, conscientiousness, and emotional stability—were measured using the ten-item personality inventory (Gosling et al. 2003). Respondent's household characteristics were collected in terms of number of household members for different age groups, type of residence, home ownership, and zip code.

Well-being and pandemic impacts

This research aims at investigating the determinants of what enables people's leisure activity participation. Model results from the 2019 survey found a positive and significant correlations between instrumental social support and leisure activity variety. This increased activity variety has also been accounted for by the personality traits of being open to experience and extraverted.

While increased leisure activity participation enhances individual's wellbeing and quality of life, existing literature has not had a clear understanding of how much leisure activities contributes to increasing wellbeing. Thus, including wellbeing measures in future survey can help quantify the correlations of leisure activity participation compared to other aspects such as income, social resources, and inherent personalities. Furthermore, the two distinct constructs of instrumental resources (which leads to increase in wealth, power, and status) and expressive resources (which leads to increase in health and life satisfaction) can be used to examine their correlations with social capital outcomes (e.g.: leisure activity and self-reported wellbeing).

In order to select appropriate well-being instruments, DeVos et al. (2013) suggested consider both eudaimonic and hedonic well-beings. They are two distinct aspects of wellbeing because hedonic is related to happiness and general life satisfaction, and eudaimonic is about fulfilling self-actualization. Well-cited and well-applied instruments were used to measure life satisfaction (Diener et al., 1985) and psychological flourishing (Diener et al., 2010)

As lives were upended since the onset of COVID-19 transmission, the pandemic impact questionnaire was utilized to measure the well-being of respondents in the survey distributed in late 2020 (Palsson et al., 2020). Three questions about isolation from the ISSP (Joye et al. 2019) were also asked to measure the respondents (1)lack companionship, (2) felt isolated from others or (3) left out.

RETROSPECTIVE SURVEY DESCRIPTIVE ANALYSIS

Data collection

A cross-sectional survey was designed to better understand social factors influencing leisure activity participation. The survey design and administrations are outlined in **Error! Reference source not found.** The survey used nonprobability-based sampling across three web-based survey platforms: Qualtrics panels, Amazon Mechanical Turk (MTurk), and Prolific. For the 2019 survey, participants from MTurk were younger and less female than the Qualtrics panel. To balance the gender proportion, the Qualtrics panel was quota-based with a 40% male – 60% female split, and the survey was also distributed to 118 female participants on the Prolific platform. Three sampling sources was utilized in a different proportion shown in Table 1 for the 2020 survey for cost effectiveness and response quality. Survey correspondence was recorded after participants accepted the survey consent and met any quotas. Before distributing compensation, each response was promptly validated to ensure sufficient attention and accuracy. The responses were rejected if they were completed in less than five minutes or had substantial missing, inconsistent/invalid answers.

Table 1. Survey methodology summary

Characteristic	Description	
Survey name	Leisure Activity and Social Resource Survey	
Target population	US adults aged 18 years and older	
Sampling frame	Adults with internet in an internet-based survey panel [Qualtrics Panels] Women with internet in an internet-based survey panel [Prolific] Registered US MTurk workers with task approval rates > 90% and at least 100 approved tasks [MTurk]	
Recruitment	Advertised task, \$3.00 incentive [Prolific, MTurk] Email recruitment, varied incentives unknown to researcher [Qualtrics Panels]	
Sample design	Nonprobability-based sample: convenience sample [MTurk] Nonprobability-based sample: quota-based (gender) [Qualtrics Panels, Prolific]	
Use of interviewer	Self-administered	
Mode of administration	Self-administered via the internet	
Time dimension	Cross-sectional survey	
Frequency	One phase of collecting responses	
Level of observations	Individual, household	
Change in survey year	2019	2020
Time frame	November and December	December
Number of total responses	Before data cleaning: 1,932 After data cleaning: 1,275	Before data cleaning: 3,464 After data cleaning: 2,500
Sampling source	Amazon Mechanical Turk (46% of the data), Qualtrics Panel (46%), and Prolific (8%)	Amazon Mechanical Turk (20% of the data), Qualtrics Panel (40%), and Prolific (40%)

Sample descriptive statistics

Descriptive statistics of the survey respondents are provided in **Error! Reference source not found.** While there might be some repeated respondents in each panel, there was no tracking of returning respondents for the 2019 and 2020 samples.

Table 2. Descriptive statistics of respondents' socio-demographics

Variable	Description	2019	2020
Age	Mean (Standard deviation)	46.9 (16.9)	47.4 (17.7)
	Median	45.0	45.0
Education	Less than high school	0.7%	1.6%
	High school graduate	12.2%	15.4%
	Some college, no degree	18.4%	21.1%
	Associate degree	9.5%	9.0%
	Bachelor's degree	35.4%	33.2%
	Graduate degree	19.6%	16.4%
Employment	Full-time	57.0%	40.9%
	Part-time	12.7%	12.9%
	Retired	15.9%	22.1%
	Student (not employed for pay)	1.9%	3.7%
	Disabled (not employed for pay)	2.9%	5.4%
	Not employed for pay	6.7%	12.2%
Gender	Female	50.3%	49.2%
	Male	49.2%	50.8%
Household income (in US dollars)	Under \$15,000	5.5%	10.2%
	\$15,000–\$24,999	9.6%	10.6%
	\$25,000–\$34,999	10.6%	10.4%
	\$35,000–\$49,999	16.0%	15.4%
	\$50,000–\$74,999	22.3%	19.4%
	\$75,000–\$99,999	15.1%	15.3%
	\$100,000–\$149,999	12.5%	12.3%
	\$150,000–\$199,999	5.9%	5.4%
	\$200,000–\$249,999	2.2%	1.2%
	\$250,000 or more	2.0%	1.9%
Household size	One person	22.2%	19.8%
	Two people	38.2%	36.9%
	Three or more people	39.6%	43.2%
Marital status	Married/domestic partnership	48.1%	47.5%
	Widowed	5.0%	3.0%
	Divorced	9.6%	9.0%
	Living with a partner	7.2%	8.6%
	Never been married	29.8%	30.6%
Race	Asian	6.9%	6.4%
	Black or African American	9.7%	9.8%
	White	82.0%	81.2%
	Other race	5.0%	5.3%
Ethnicity	Hispanic origin	8.2%	7.2%
Household vehicle	No vehicle	7.8%	8.3%
	One	37.2%	35.4%
	Two	39.1%	36.4%
	Three or more	15.7%	19.8%
Sampling source	MTurk	46.4%	20%
	Prolific	8.6%	40%
	Qualtrics	45%	40%
Number of valid responses		1,275	2,500

Activity space

Survey respondents reported participation in different activity types over the last three months of 2019 and 2020 from a list of 86 leisure activities. The 2019 respondents averaged 15.6 unique activities and a standard deviation of 8.1 unique activities, while the 2020 sample reported a reduced mean 11.0 unique activities with a standard deviation of 6.5 unique activities. **Figure 2** presents the distributions of the number of unique activities across three sampling sources for 2019 and 2020. The distributions of activity variety across all three panels were skewed towards the left for 2020 indicating the reduction of activities the respondents participated which were also due to the public health restriction due to the COVID-19 pandemic.

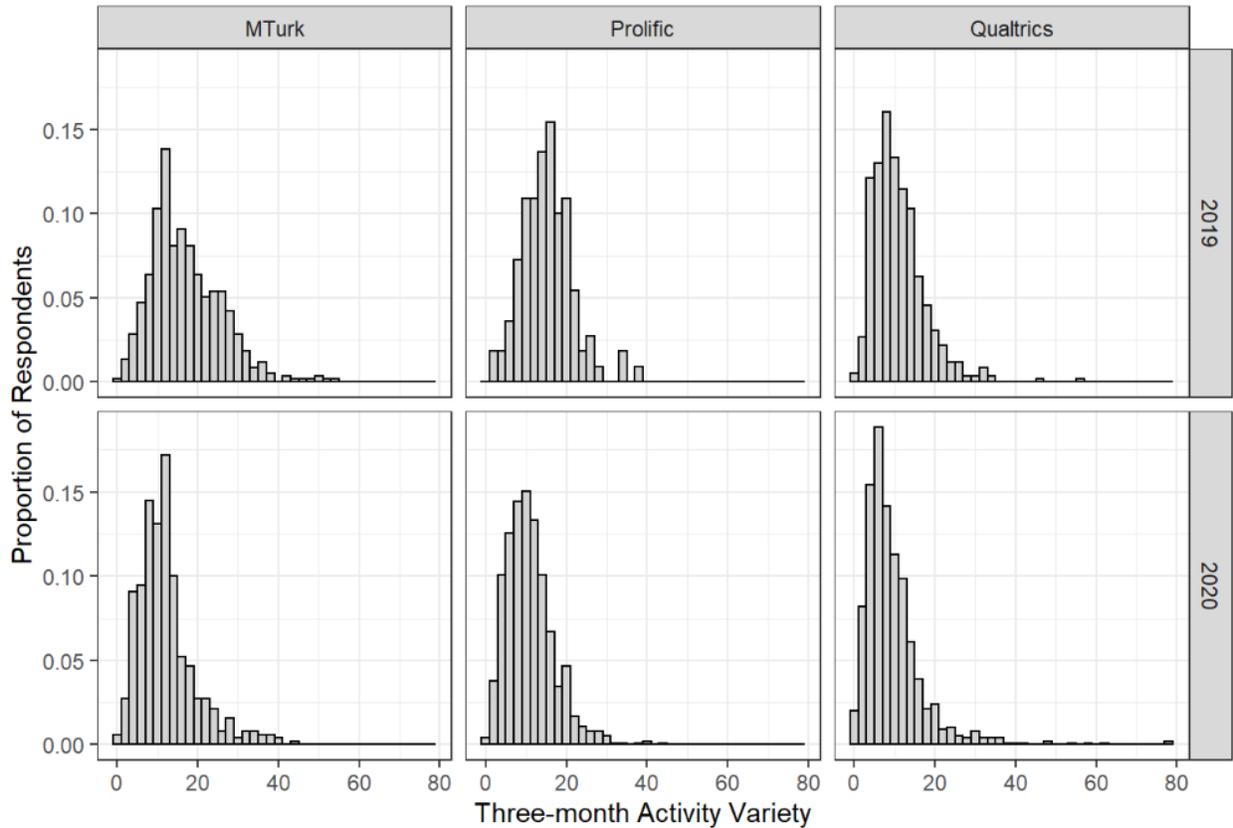


Figure 2. Histograms of activity variety for 2019 and 2020 samples by sampling sources

Table 3 presents the list of 20 most popular activities for the two-year samples. 80% of 2019 respondents selected dining out as one of their leisure activities while only 38% of 2020 respondents did during the same three-month period. This showed the pronounced change of available activities in public places during the pandemic. The top two most common activities in 2019 were dining out and visiting friends and relatives—both involved more social interactions—in contrast to radio listening and baking/cooking for leisure activities that may not require companions. Overall, the activity profiles across two years show popularity changes as the most common activity in 2020 being radio listening was only shared by 51% of respondents.

Table 3. List of 22 popular activities that respondents participated in

Leisure Activity	Percent of Respondents and Ranking			
	2019		2020	
Dining out	80%	1	38%	10
Visiting friends and relatives	68%	2	41%	6
Radio listening	56%	3	51%	1
Baking and cooking for leisure	51%	4	50%	2
Reading newspapers and magazines	50%	5	45%	4
Reading fiction	48%	6	46%	3
Drinking and socializing	46%	7	23%	17
Watching football	46%	8	20%	22
Going to a movie theater	45%	9	40%	7
Computer games	43%	10	44%	5
Reading nonfiction	42%	11	40%	8
Nature walks	41%	12	39%	9
Video games (not computer)	37%	13	35%	11
Board gaming	33%	14	30%	14
Working puzzles	33%	15	27%	15
Playing cards	32%	16	32%	13
Attending church	30%	17	16%	27
Driving for pleasure (joyriding)	30%	18	32%	12
Photography	26%	19	21%	19
Gardening: house plants	25%	20	26%	16
Hiking	25%	21	21%	20
Jogging	24%	23	22%	18

Because the 2020 sample was independent from 2019 sample, direct comparison of year-over-year changes of activity participation were not possible. To obtain a proxy of respondents' activity alteration due to the pandemic, 2020 respondents were asked: "Since April 2020, how has your frequency of participating in the [top 20 most popular activities in 2019] changed?" as shown in Figure 3. The number of people who selected each of the 20 activities was indicated in parentheses. About two-third of the people who dined out, or went to a movie theater, or visit friends/relatives over the last three months reported that their frequency for those activities were less since the onset of the pandemic (i.e.: April 2020 for the U.S.). Minimal reduction in frequency were reported for radio listening, various reading activities, playing computer/video games, and gardening house plants. Despite the many unprecedented public health restrictions since April 2020, there were between 22% to 59% of respondents reported no change in their participation frequency for these 20 activities.

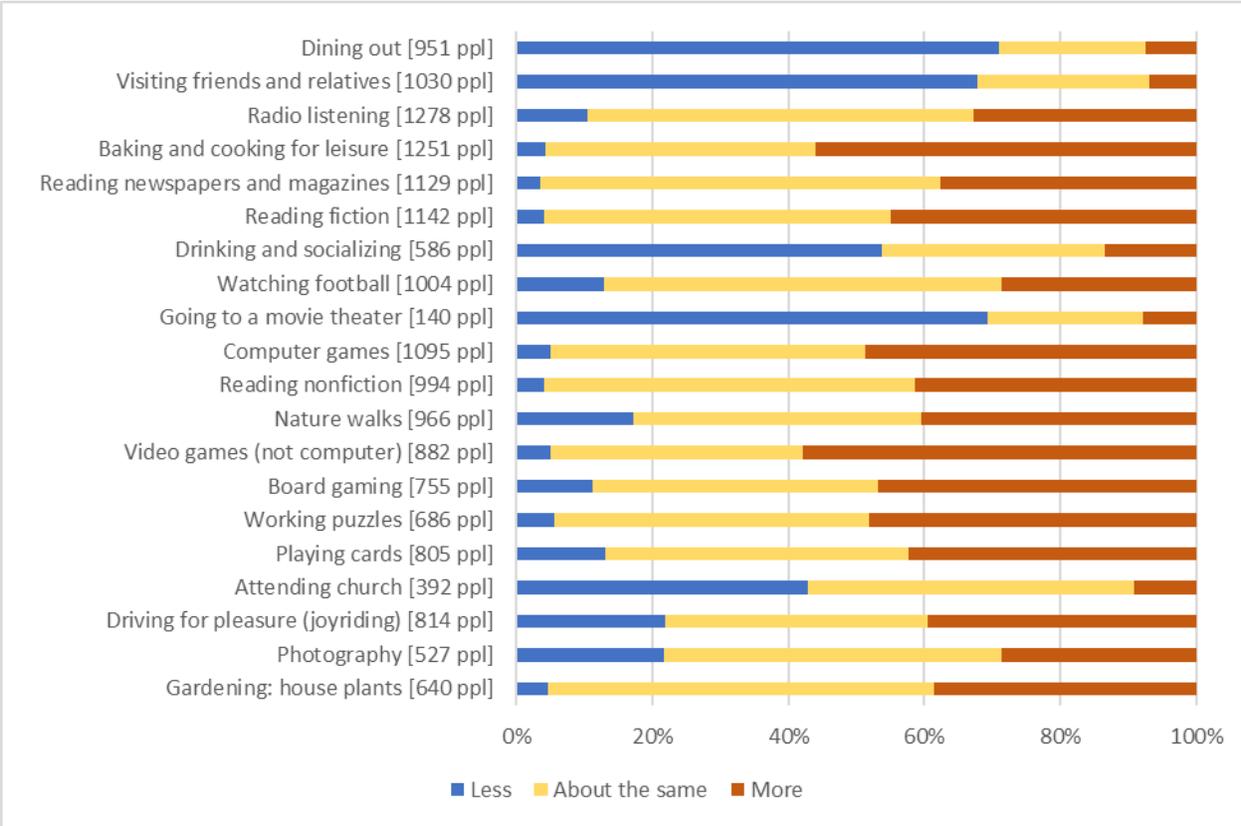


Figure 3. Distributions of reported frequency changes for 20 activities since April 2020

The survey also gathered the changes in the way individuals planned or performed leisure activities with different groups of people compared to before the COVID-19 pandemic. As shown in Figure 4, 2020 survey respondents have significant reduction (indicated by the somewhat less and much less categories) of planning or performing leisure activities with people not in the household and individuals aged 65 or older.

Since the selection of activity and indication of each activity frequency still did not provide details of whom respondents participated with as well as the location and associated travels. To enrich the understanding of respondents’ leisure and travel profiles while reducing survey burden, respondents in 2020 were asked “over the last three months, how often did you participate in leisure activities in the following ways?” Figure 5 shows the distributions of six different ways of leisure activities’ location/travel companion.

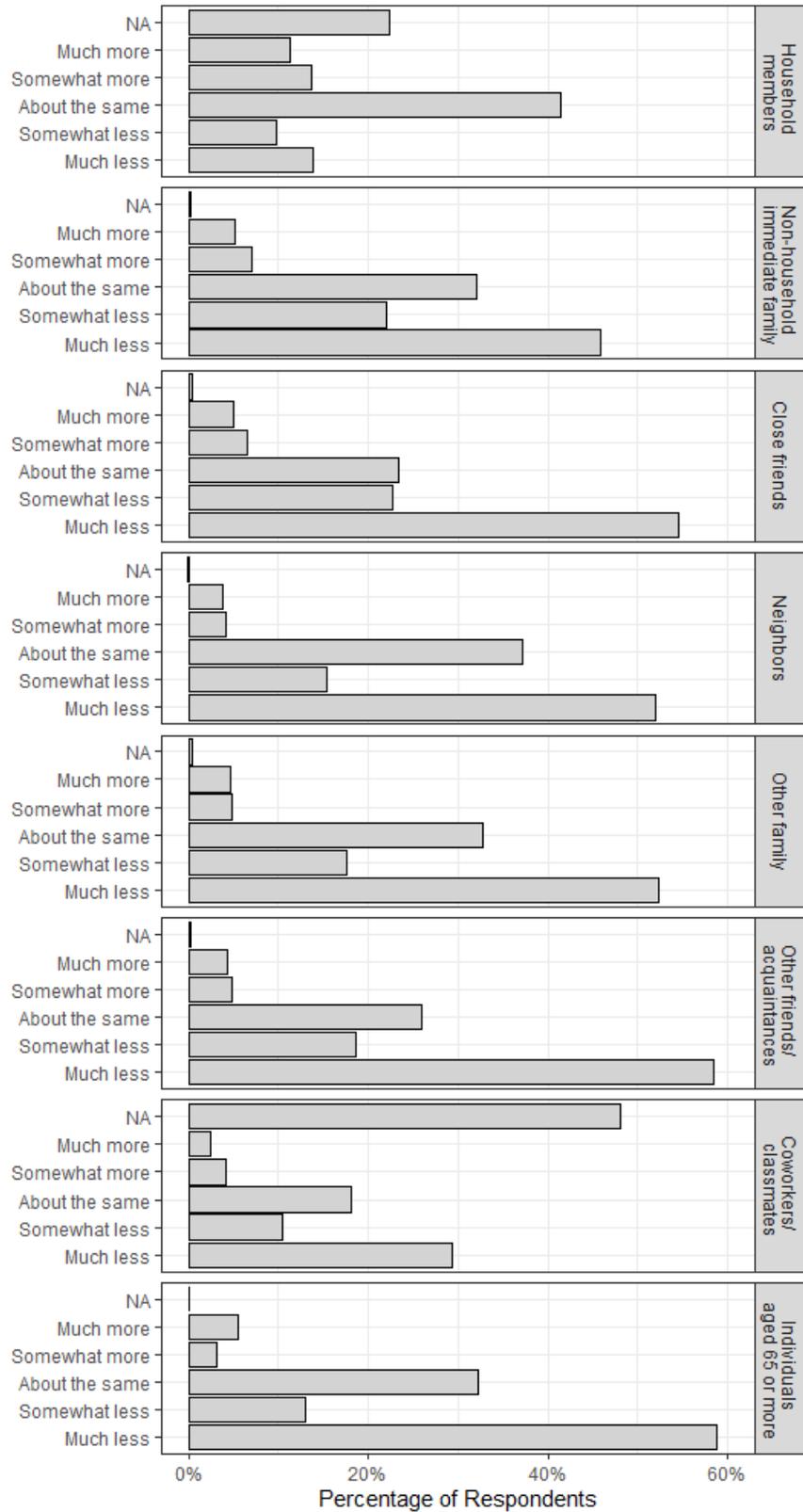


Figure 4. Distributions of changes in leisure company in 2020

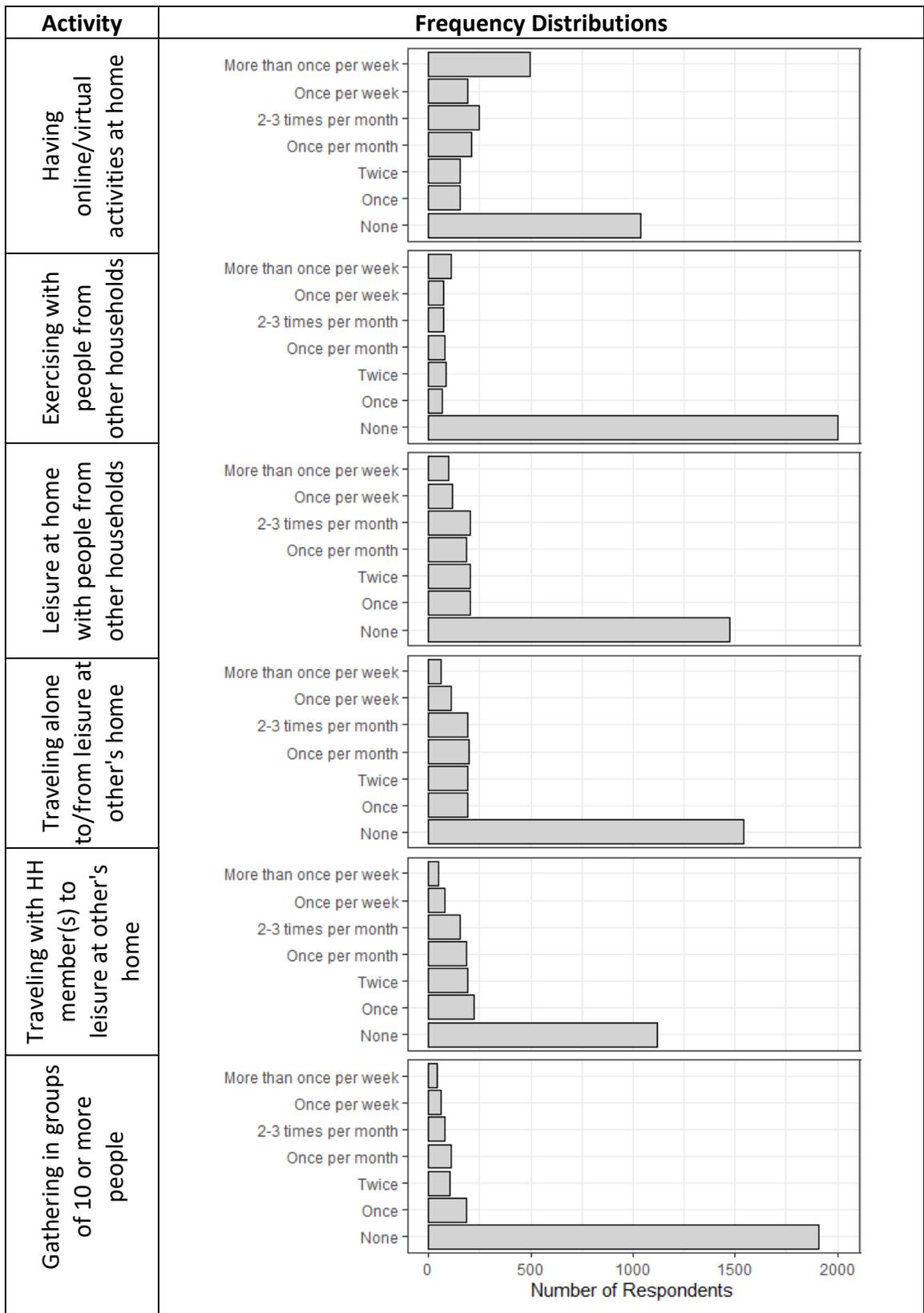


Figure 5. Distributions of leisure activities' location/travel companion frequency in 2020

As activity space was also constrained by the time devoted to mandatory and maintenance tasks, Figure 6 shows the distributions of reported hours spent on work school (for workers and students). Figure 7 shows the distributions of reported hours spent on mandatory tasks such as doing chores, shopping for grocery, preparing food, and caring for children or adults.

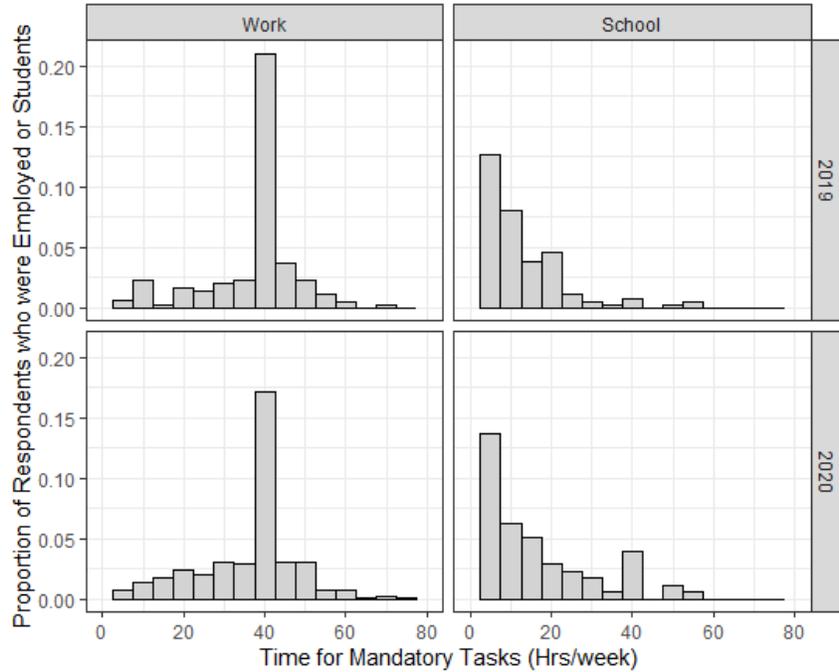


Figure 6. Histograms of weekly work or school hours

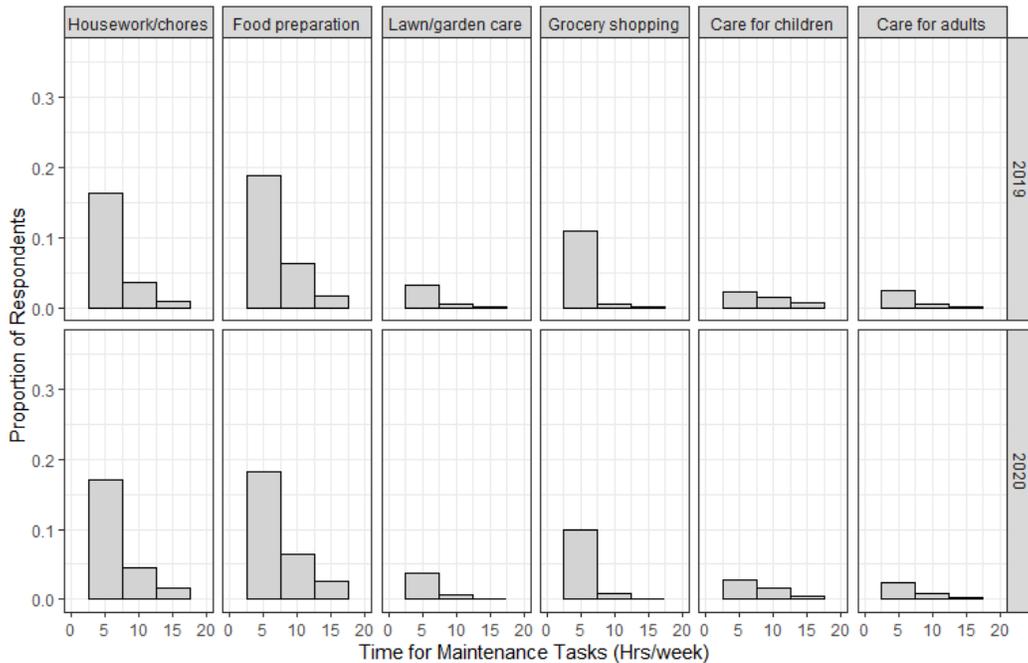


Figure 7. Histograms of weekly hours spent on maintenance tasks

Social capital

The survey results of three social capital instruments are presented in Table 4 for the cleaned 2019 and 2020 samples. While there are some slight decreases for 2020, all three measures seem to have stable and comparable values between the two years.

Table 4. Descriptive statistics of social capital measures

Social Capital Measures	Statistics of the Sample	2019	2020
Network occupational volume	Mean	7.00	6.45
	Standard deviation	5.78	5.73
	Minimum	0	0
	5 th percentile	0	0
	25 th percentile	3	3
	50 th percentile	6	6
	75 th percentile	10	9
	95 th percentile	16	15
	Maximum	22	22
Accessible social resource volume	Mean	11.64	11.45
	Standard deviation	2.96	3.23
	Minimum	0	0
	5 th percentile	5	4
	25 th percentile	10	10
	50 th percentile	13	13
	75 th percentile	14	14
	95 th percentile	14	14
	Maximum	14	14
Strong tie volume	Mean	3.45	3.24
	Standard deviation	2.46	2.43
	Minimum	0	0
	5 th percentile	0	0
	25 th percentile	2	2
	50 th percentile	3	3
	75 th percentile	5	4
	95 th percentile	10	10
	Maximum	10	10

The distributions of network occupational volume, measured by the number of known occupations from the position generator, is shown in Figure 8 for three sampling sources. The network occupational volume has a slight decrease from a mean of 7.00 occupations for the 2019 sample and to 6.45 average known occupations for the 2020 sample.

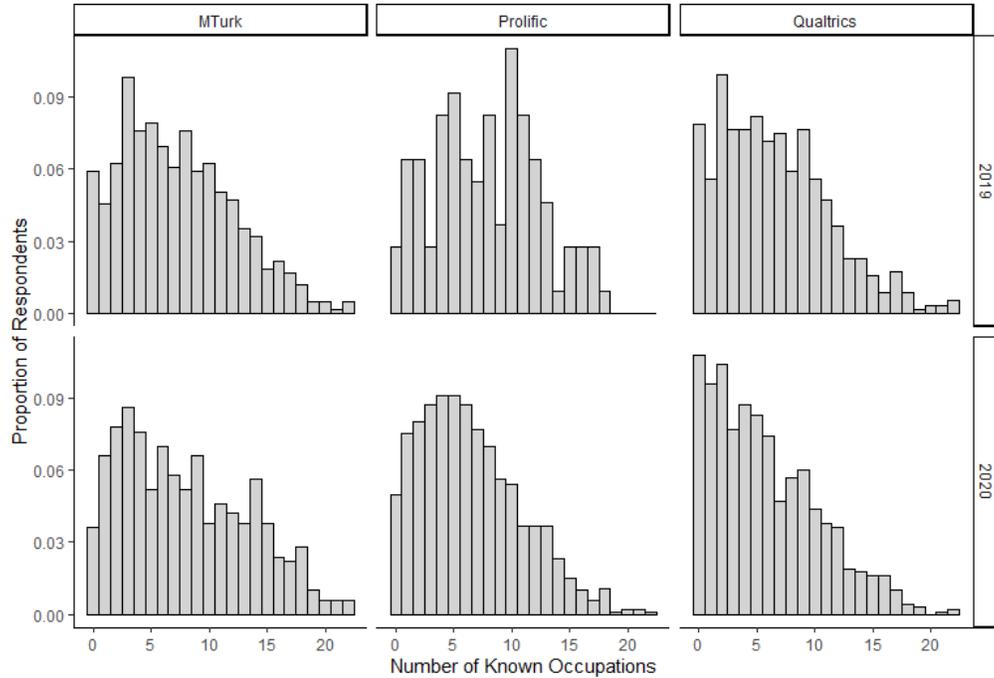


Figure 8. Histograms of network occupational volume for 2019 and 2020 samples by sampling sources

As there are 22 occupations in the position generator, the percentage of respondents personally knowing someone (a relative, friend, or acquaintance) on a first-name basis with that profession was shown in Figure 9. Not only that the network occupational volume remains relatively stable, the composition of knowing each occupation also remains similar. There is a noticeable reduced proportion of respondents who knew a receptionist in 2020, which could be due to increased remote work as well as virtual services offered during the pandemic.

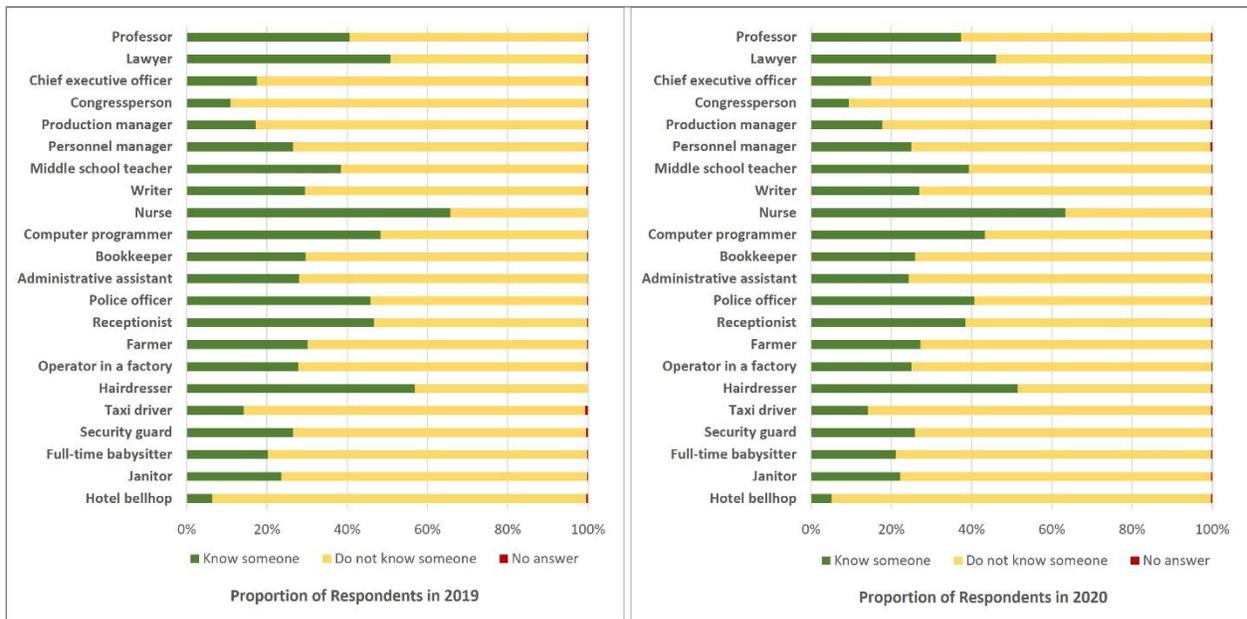


Figure 9. Share of respondents knowing someone with each occupation

Accessible social resource volume is defined as the sum of the fourteen resources indicated accessible to respondent by someone their social network. Although 26 resources were asked in the 2019 survey as listed in section 3.2.2, only 14 resources used by Joye and colleagues for the ISSP exploratory survey (2019) were asked in the 2020 survey. Thus, for ease of comparison, only the same fourteen resources used in both surveys were applied for the descriptive statistics (Figure 10). About 36.5% of 2019 survey respondents reported that their network offers access to all fourteen expressive resources compared to 37.7% of 2020 respondents.

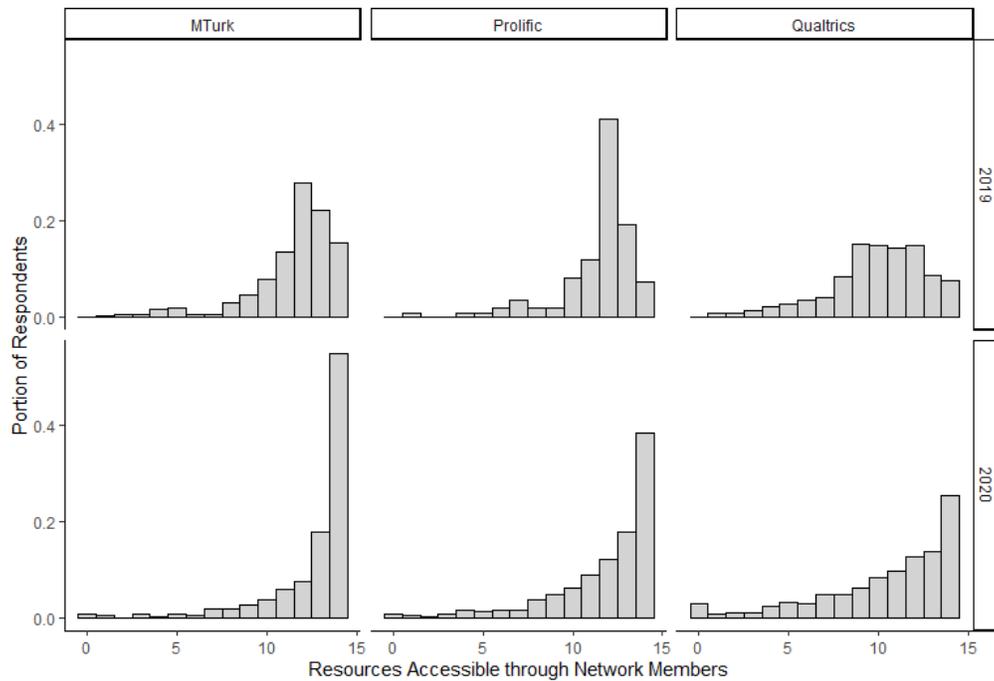


Figure 10. Histograms of accessible social resource volume for 2019 and 2020 samples by sampling sources

Figure 11 shows share of different network members through whom the respondents' can access fourteen resources (Joye et al., 2019). Close family members were a major source of looking after the respondents if being serious ill or helping around the house during sickness. Close friends were one of the main sources for emotional support (e.g.: to talk to, make one's feel appreciated, give advice). Between 10% to 13% of respondents in both samples can access help with finding a job or computer problems through colleagues or coworkers.

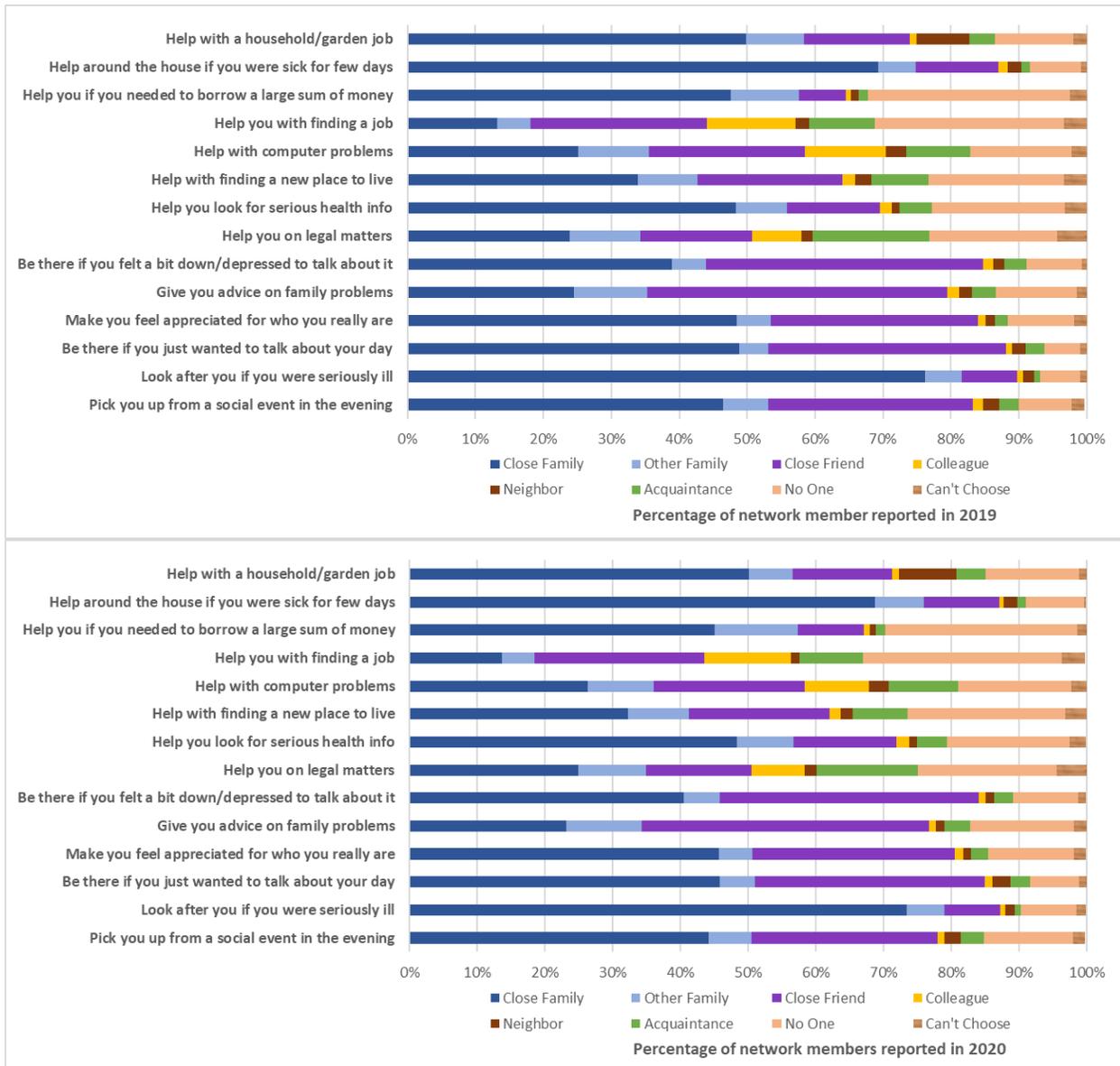


Figure 11. Share of network members providing each social resource

Strong tie volume is the reported number of people that a respondent had discussed important matters with over the last three months. It is left censored with “10 or more” represented as 10 strong ties (Figure 12). Although an individual could still discuss important matters via phone calls, chats and other communication technology, the strong tie volume was slightly decreased in 2020 which could be due to the limited opportunities to meet in person due to social distancing. Figure 13 illustrates the positive correlations of household size with the reported number of people respondents discussed important matters with.

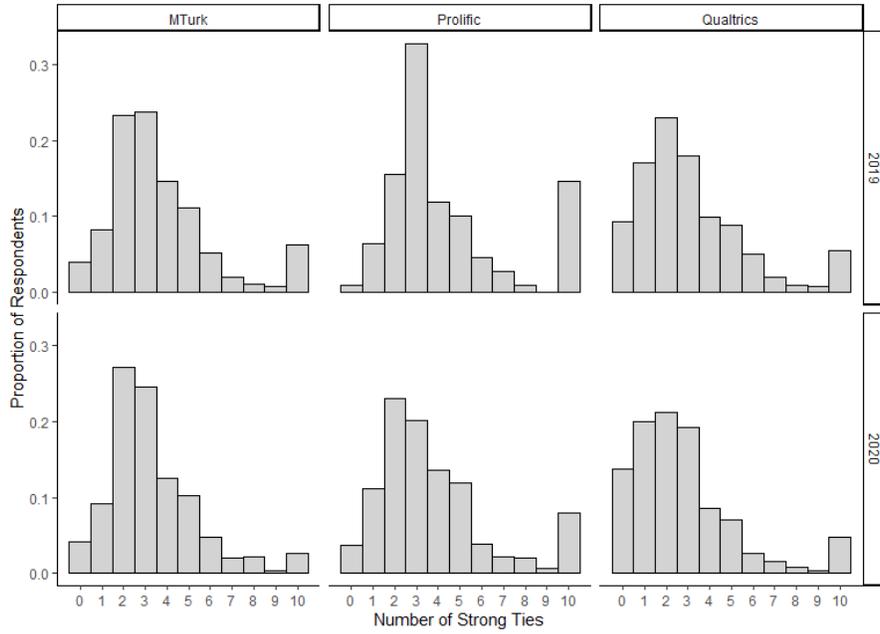


Figure 12. Histogram of strong tie volume for 2019 and 2020 samples by sampling sources

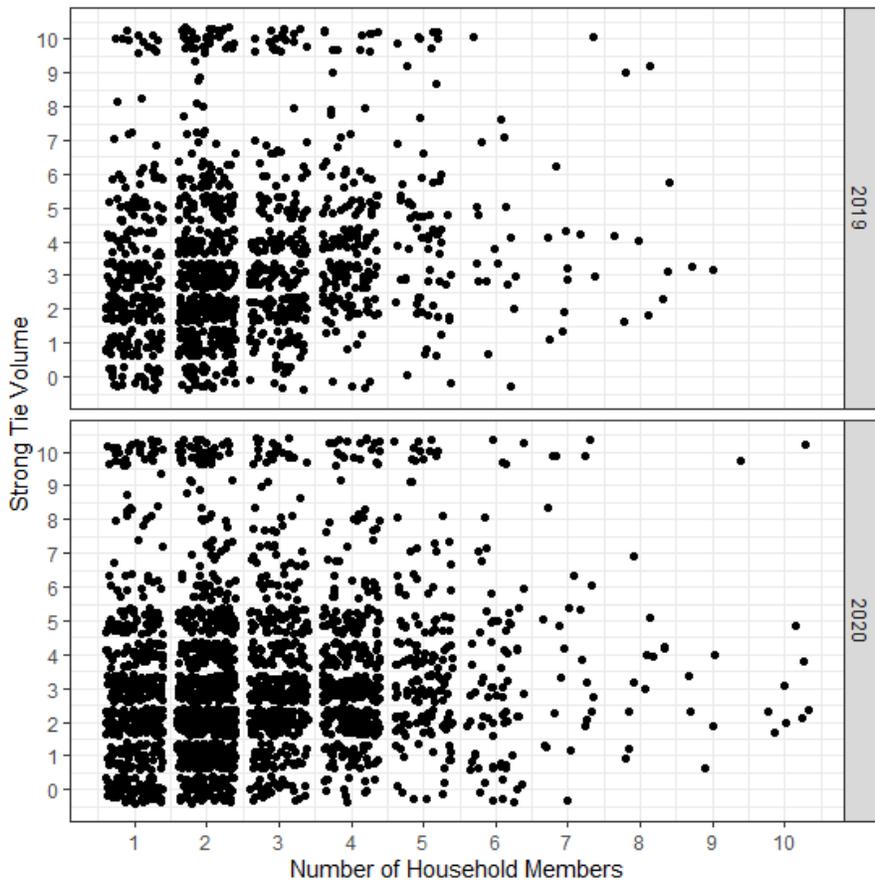


Figure 13. Correlations of household size and the reported strong tie volume

Mobility/accessibility

As having a driver license is an indicator of the ability to driving oneself to places, the percentage of respondents who have a state-issued driver license are reported in Table 5. There were a smaller proportion of respondents in 2020 compared to 2019 (88.1% vs. 92.8%) possessing a driver license which might be due to the limited opportunities to renew or obtain a new driver license during the pandemic. The proportion of respondents reported having travel disability were similar across two years (7.0% in 2019 and 7.4% in 2020).

Table 5. Cross-tabulation of having driver license and self-reported travel difficulty

		Having a state-issued driver license			
		2019		2020	
Having travel disability		Yes	No	Yes	No
	No	87.3%	5.7%	82.2%	10.4%
	Yes	5.5%	1.5%	5.9%	1.5%

Figure 14 shows the distributions of the number of motorized vehicles (including motorcycles) available in the households. On average, there were 1.69 and 1.77 motorized vehicles in for the household for the 2019 and 2020 samples, respectively.

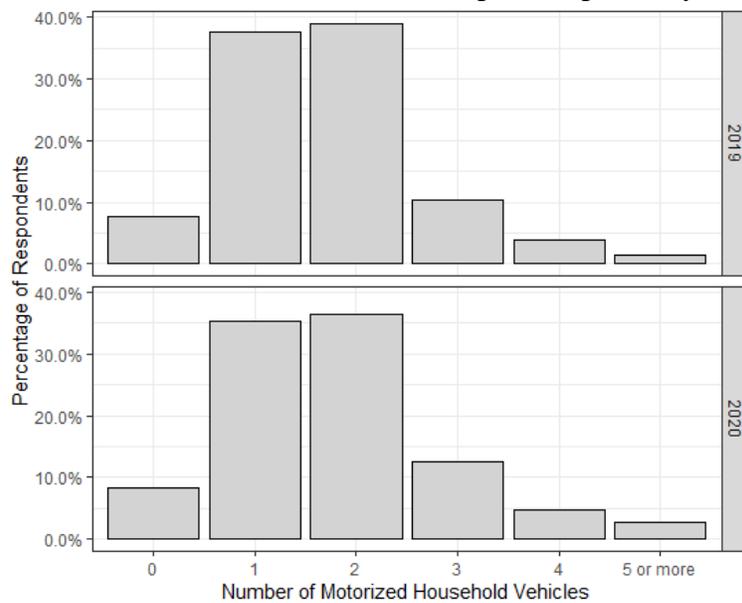


Figure 14. Distributions of available motorized vehicles in the household

Figure 15 presents the correlations of household size with the number of motorized vehicles in the households. There are households with three or more members without a motorized vehicles.

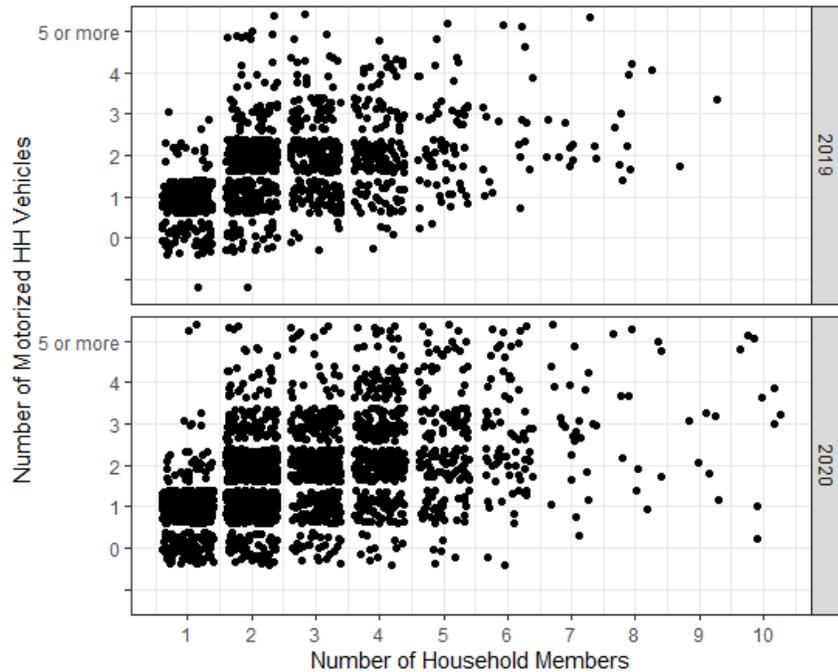


Figure 15. Correlations of household size and motorized vehicles

Although about half of the workers and students across two years drove alone as a primary mode of commuting, there is a significant increase in remote work or online school as a response to the pandemic (Table 6).

Table 6. Share of workers and students’ commute modes

Commute Mode	2019		2020	
	Count	Proportion	Count	Proportion
Drive alone	610	47.8%	798	55.6%
Remote work/school	137	10.7%	421	29.3%
Bus (public transit)	40	3.1%	79	5.5%
Carpool with only family/household member(s)	40	3.1%	40	2.8%
Walk (or jog/wheelchair)	39	3.1%	39	2.7%
Light rail or metro/subway	34	2.7%	21	1.5%
Bicycle	13	1.0%	13	0.9%
Uber, Lyft, or other ride-hailing service	9	0.7%	13	0.9%
Other mode	38	3.0%	12	0.8%
Total	960 (75% of 2019 sample)		1436 (57% of 2020 sample)	

All respondents were asked about their usage of other alternative transportation means. Figure 16 shows the usage frequency for bicycle, ridehailing service (e.g. Lyft, Uber), and transit (e.g. bus, light rail, metro/subway).

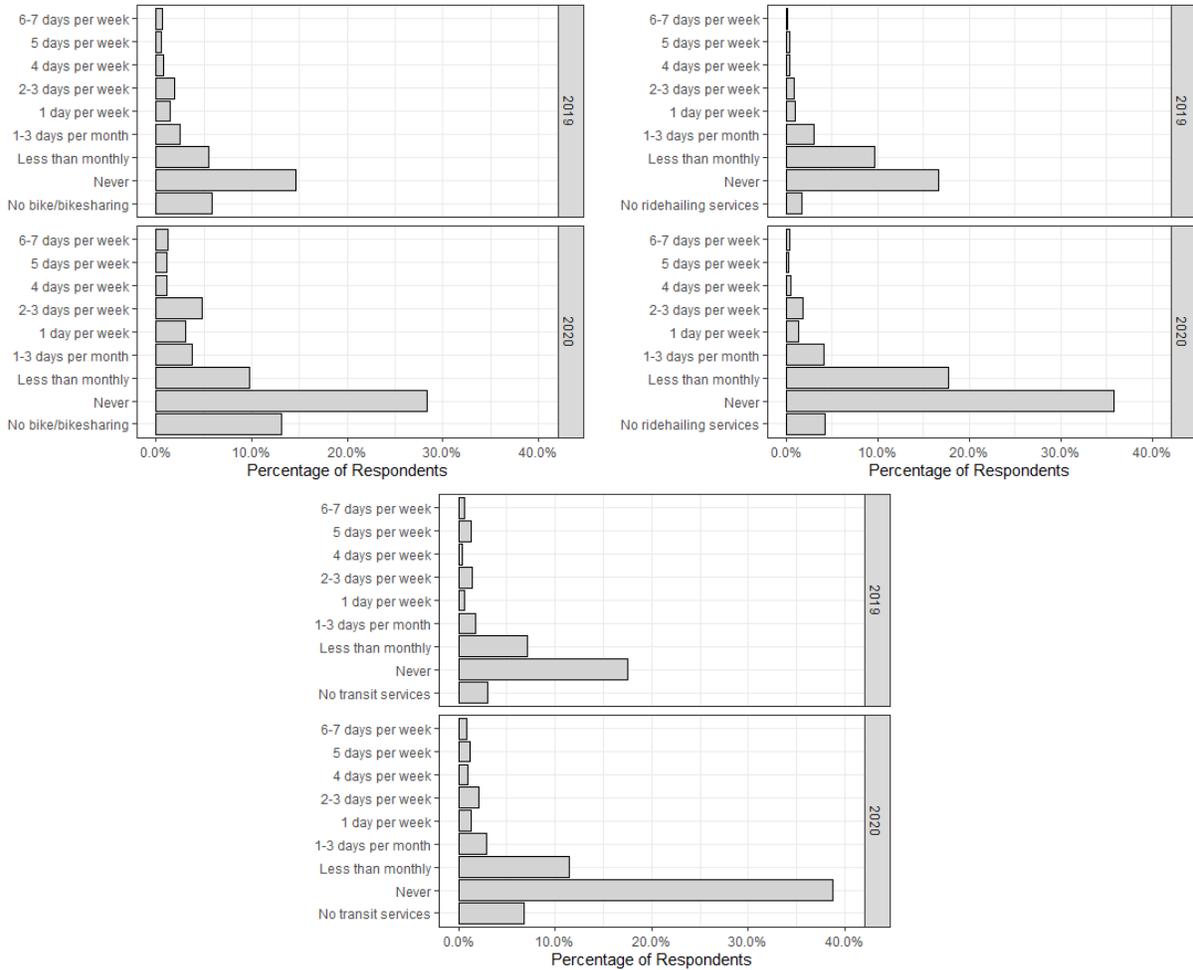


Figure 16. Usage frequencies for alternative transportation modes

Personalities

Respondents' five main personality traits—extraversion, openness to experience, agreeableness, conscientiousness, and emotional stability—were measured using the ten-item personality inventory (Gosling et al. 2003) with each personality trait score was computed as a sum of two items. The personality profiles remain largely similar for the 2019 and 2020 samples as seen in Figure 17. Higher score means the individuals have more pronounced traits. For example, a score of 6 would indicate higher levels of extraversion or being extraverted.

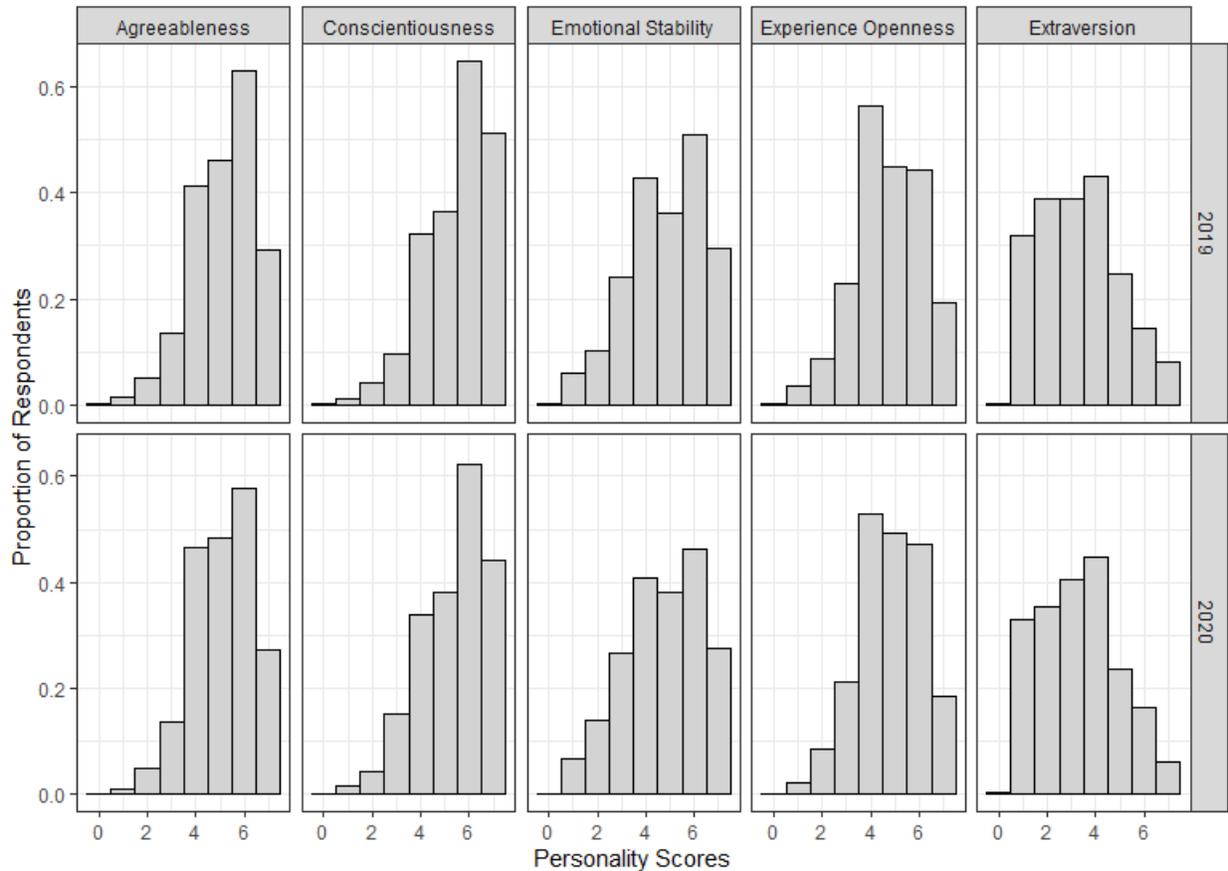


Figure 17. Histogram of personality scores for 2019 and 2020 samples by sampling sources

Well-being instruments

For the 2020 survey, respondents' subjective well-being were measured using two popular well-being inventories. The life satisfaction scale proposed by Diener et al. (1985) was used to measure happiness and general life satisfaction with the following items:

1. In most ways my life is close to my ideal.
2. The conditions of my life are excellent.
3. I am satisfied with my life.
4. So far I have gotten the important things I want in life.
5. If I could live my life over, I would change almost nothing.

Respondents were presented with the seven Likert choices ranging from strongly disagree to strong agree. Figure 18 shows the pairwise correlation plots (lower triangle) and Pearson correlation values (lower triangle) among the above five items. The diagonal boxes show the histograms for each item with the higher scores indicating higher level of life satisfaction. This scale has a strong internal consistency of 0.921.

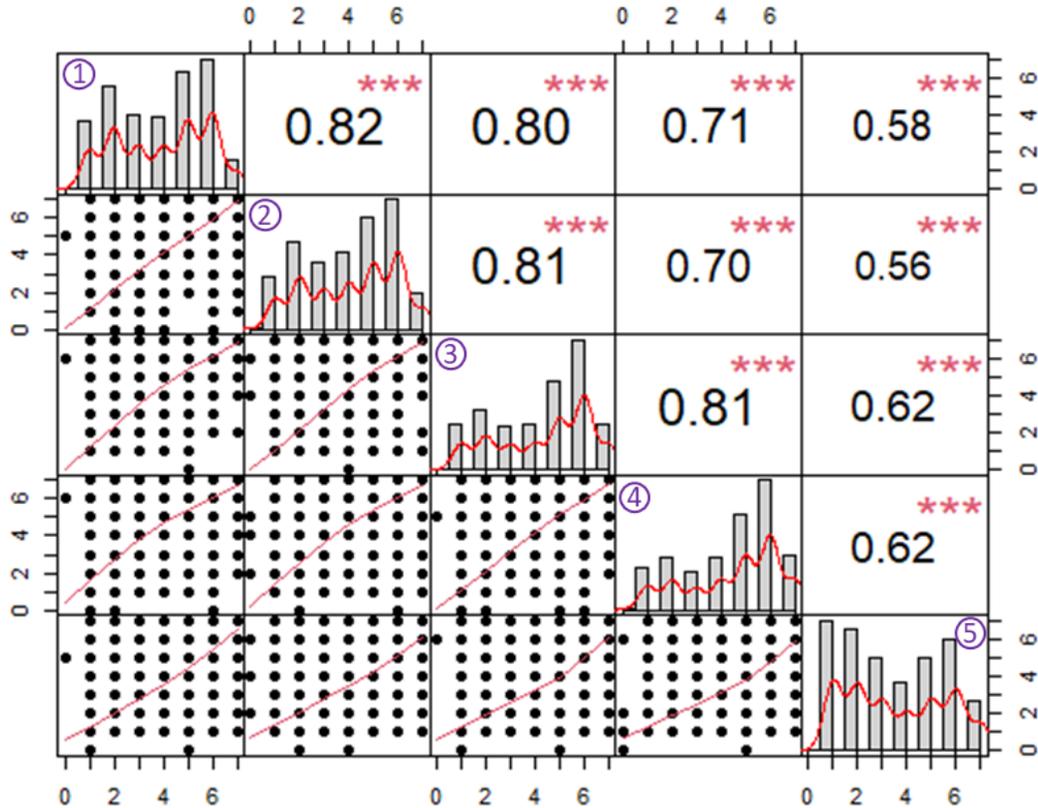


Figure 18. Correlation plots and histograms of life satisfaction scale

The 2020 survey respondents were further asked about their perceived level of fulfillment in various areas such as life trajectories, relationship, activities, and self-esteem using the flourishing scale proposed by Diener et al. (2010). The following eight items were presented in a fixed order to all respondents in 2020:

1. I lead a purposeful and meaningful life
2. My social relationships are supportive and rewarding
3. I am engaged and interested in my daily activities
4. I actively contribute to the happiness and well-being of others
5. I am competent and capable in the activities that are important to me
6. I am a good person and live a good life
7. I am optimistic about my future
8. People respect me

Respondents were presented with the seven Likert choices ranging from strongly disagree to strong agree. Figure 19 shows the pairwise correlation plots (lower triangle) and Pearson correlation values (lower triangle) among the above eight items. The diagonal boxes show the histograms for each item with the higher scores indicating higher level of flourishing or life fulfillment. This scale has a strong internal consistency of 0.912.

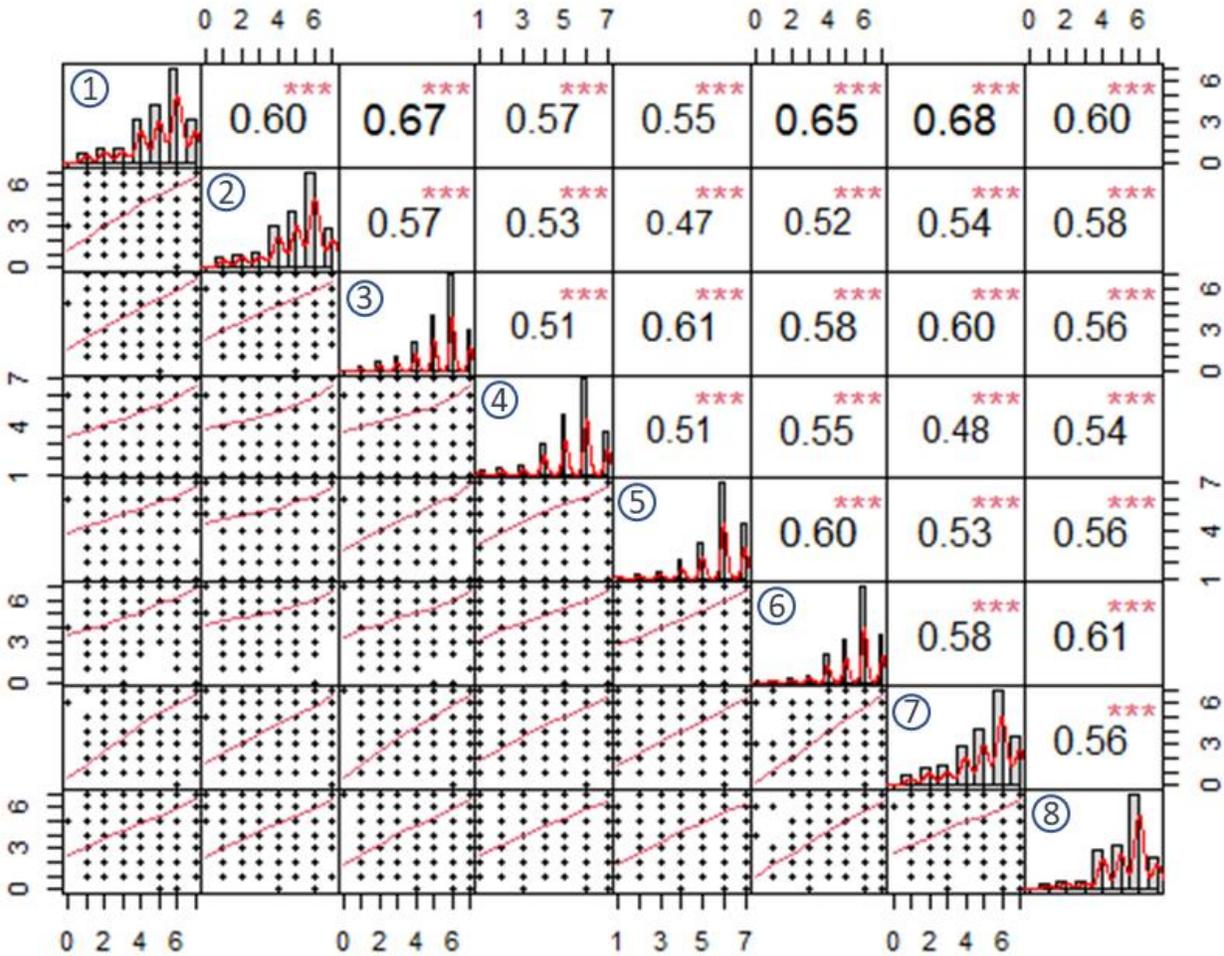


Figure 19. Correlation plots and histograms of flourishing scale

Leisure activity frequency

Since the main objective of the study was to gain more insights into the frequency of leisure activities and their impact on social capital, the survey is specifically designed to collect the participation frequency of leisure activities. Survey respondents were presented with a list of 86 different leisure activities to select “Which of the following activities have you performed over the last three (3) months?” Adopted from Tinsley and Eldredge (1995), 77 out of their 82 activities were adopted – arcade games, collecting bottles, shortwave radio listening, volunteering for crisis intervention, and watching television were excluded due to being outdated, dependent on specific crisis events, or overabundance. Nine additional leisure activities were added including: attending festivals and parades, board gaming, joyriding, gambling, gardening in community gardens, softball, singing karaoke, video games, and visiting amusement/theme parks. Activities that are similar such as hiking and backpacking were placed next to each other for clarification. The survey respondents were then asked to indicate the participation frequency for each of the activities that they participated in over the last three months using six choice categories: once, twice, once per month, 2-3 times per month, once per week, more than once per week.

As the participation frequency is specific to each unique activity, (e.g.: a respondent answered that he dined out more than once a week while visiting friends and relative twice), Table 7 summarizes the distribution of the participation frequency for the 20 most popular activities.

Table 7. Distribution of participation frequency for the 20 most popular activities

Activity	Did not participate	Once	Twice	Once per month	Twice-thrice per month	Once per week	More than once per week
Dining out	20%	2%	4%	13%	24%	22%	14%
Visiting friends and relatives	32%	3%	4%	11%	19%	18%	13%
Radio listening	44%	0%	0%	1%	5%	6%	43%
Leisure baking and cooking	49%	2%	2%	6%	12%	10%	19%
Reading newspapers and magazines	50%	0%	1%	2%	5%	7%	35%
Reading fiction	52%	1%	1%	5%	7%	8%	26%
Drinking and socializing	54%	2%	3%	9%	14%	12%	6%
Watching football	54%	1%	2%	2%	8%	15%	17%
Going to movie theater	55%	9%	8%	16%	9%	3%	1%
Computer games	57%	1%	1%	2%	4%	8%	28%
Reading nonfiction	58%	1%	1%	4%	6%	8%	22%
Nature walks	59%	3%	5%	7%	11%	8%	7%
Video games	63%	1%	2%	1%	4%	7%	22%
Board games	67%	4%	4%	8%	9%	5%	2%
Working puzzles	67%	2%	2%	3%	6%	6%	15%
Playing cards	68%	3%	4%	6%	10%	5%	3%
Attending church	70%	2%	2%	3%	4%	14%	4%
Joyriding	70%	2%	3%	6%	8%	7%	4%
Photography	74%	1%	2%	3%	7%	5%	7%
Gardening house plants	75%	1%	1%	2%	4%	8%	9%

METHODOLOGY

Zero-inflated ordered probit model with correlated error terms

As this paper focuses on exploring the effects of social capital, especially expressive social support on increasing participation frequency, the twenty most selected activities in our survey were examined. The set of twenty activities was determined by balancing the number of different activities versus their popularity. As reported in **Error! Reference source not found.**, only 25% of the respondents selected the 20th popular activity (gardening house plants) and the participation in subsequent activities are much lower.

Survey respondents were asked to indicate the participation frequency for each of their chosen activity using six choice categories: once, twice, once per month, 2-3 times per month, once per week, more than once per week. As this participation frequency is a cardinal variable that has increasing frequency values, the ranges between two categories are not linear. Thus, an ordered response model is appropriate to examine the participation frequency (dependent variable) for each of the twenty selected activities. There is a total of seven participation frequency categories with the zero-participation category being coded when the survey respondents did not select that activity when asked “Which of the following activities have you performed over the last three (3) months?”

Since there is an explicit time period for this survey question, a zero-inflated model is needed to account for the two types of people having zero participation in a particular activity: sempiternal non-participants versus temporary non-participants. Sempiternal non-participants are the respondents who have not and will not participate in a certain activity (e.g.: a respondent who does not watch football or someone who does not play video games because they are not interested in these activities instead of other temporary constraints). Temporary non-participants are the respondents who might have participated in the past but not during our survey period of the last three months (e.g.: a respondent who does not visit relatives and friends or attend church during the last three months due to work demand). There are still limited modeling methods to distinguish these two groups, since there was not a clear question asking whether the respondents would participate in such activities given the right time or condition.

The zero-inflated ordered probit (ZIOP) models developed by Harris and Zhao (2007) can help assess the correlations between access to social resources and increased activity participation frequency. The ZIOP modeling structure accounts for two different stages of whether one participates in an activity, and if yes, how much would the influencing factors affect the increased frequency.

Harris and Zhao (2007) specify the ZIOP model by two latent equations: a binary probit equation for zero-inflation and an ordered probit equation for categorization. In this paper’s interpretation, the zero-inflated binary probit determines the likelihood to have ever participated in a particular activity. Let r be an indicator of activity participation where:

- $r = 1$ indicates recent participation or temporary non-participation
- $r = 0$ indicates sempiternal non-participation (i.e.: never participated)

A latent variable r^* maps to activity participation as follows:

$$\begin{aligned} r^* &= z'\gamma + \eta \\ r &= \mathbb{I}\{r^* > 0\} \end{aligned} \quad (1)$$

where z is a vector of explanatory variables for activity participation with estimable coefficients γ and a standard-normally distributed error term η .

Under this assumption of separated sempiternal and temporary non-participation, the probability of a survey respondent participating in a leisure activity is:

$$Pr(r = 1|z) = Pr(r^* > 0|z) = \Phi(z'\gamma) \quad (2)$$

where $\Phi(z'\gamma)$ is the cumulative distribution function (cdf) of the univariate standard normal distribution.

Conditional on $r = 1$ for the activity participants, let \tilde{y} denote a discrete variable generated by an ordered probit model for J participation frequency levels ($\tilde{y} = 0, 1, \dots, J$). Define the random variable y as the observed participation frequency that shows the relation between r and \tilde{y} as follows:

$$y = r\tilde{y} \quad (3)$$

The second equation of the ZIOP model consists of a second latent variable \tilde{y}^* as follows:

$$\tilde{y}^* = x'\beta + \varepsilon \quad (4)$$

where x is the vector of explanatory variables with estimable coefficients β and a standard-normally distributed error term ε .

The variable \tilde{y} is mapped to a latent variable \tilde{y}^* as follows:

$$\tilde{y} = \begin{cases} 0 & \text{if } \tilde{y}^* \leq 0 \\ j & \text{if } \psi_j < \tilde{y}^* \leq \psi_{j+1}, (j = 1, \dots, J-1) \\ J & \text{if } \psi_J \leq \tilde{y}^* \end{cases} \quad (5)$$

where ψ_j ($j = 1, \dots, J-1$) are estimable thresholds and with ψ_0 fixed to 0. Note, while being conditional on $r = 1$ ($r^* > 0$), the temporary non-participants can be accounted for when $\tilde{y}^* \leq 0$.

Combining equations (3) and (5) gives:

$$y = r\tilde{y} = \begin{cases} 0 & \text{if } (r^* \leq 0) \text{ or } (r^* > 0 \text{ and } \tilde{y}^* \leq 0) \\ j & \text{if } (r^* > 0 \text{ and } \psi_{j-1} < \tilde{y}^* \leq \psi_j), (j = 1, \dots, J-1) \\ J & \text{if } (r^* > 0 \text{ and } \psi_{J-1} \leq \tilde{y}^*) \end{cases} \quad (6)$$

The vectors x and z may have overlapping explanatory variables in equations (4) and (1).

Since each survey respondent may have interrelated motivations for the likelihood and the frequency of participating in a leisure activity, a ZIOP model accounting for the correlation between the two stochastic terms ε and μ is preferred in this study. The zero-inflated ordered probit with correlated disturbances (ZIOPC) modeling framework used in all twenty models specifies the bivariate normal distribution for the ε and μ error terms with the correlation coefficient ρ . The probabilities for each of the J observed outcomes for an activity participation frequency are expressed as:

$$\Pr(y) = \begin{cases} \Pr(y = 0|z, x) = [1 - \Phi(z'\gamma)] + \Phi_2(z'\gamma, -x'\beta; -\rho) \\ \Pr(y = j|z, x) = \Phi_2(z'\gamma, \psi_j - x'\beta; -\rho) - \Phi_2(z'\gamma, \psi_{j-1} - x'\beta; -\rho) \\ \Pr(y = J|z, x) = \Phi_2(z'\gamma, x'\beta - \psi_{J-1}; \rho) \end{cases} \quad (7)$$

where $\Phi_2(\cdot)$ is the cdf of the bivariate standard normal distribution with a correlated coefficient and ψ_j ($j = 1, \dots, J-1$) are estimable thresholds and with ψ_0 fixed to 0.

The first outcome of equation 7 specifies that the observed zero-participation ($y = 0$) is the sum of the sempiternal non-participation (accounted for by $[1 - \Phi(z'\gamma)]$ in the binary probit model) and the temporary non-participants (accounted for by $\Phi_2(z'\gamma, -x'\beta; -\rho)$ in the ordered probit model).

For this study's N number of respondents, the Maximum Likelihood (ML) method is used to consistently and efficiently estimate the unknown parameters $\beta, \gamma, \psi, \rho$ in equation 7. According to Harris and Zhao (2007), the following log-likelihood function is specified as:

$$LL = \sum_{i=1}^N \sum_{j=0}^J h_{ij} \ln[\Pr(y_i = j|x_i, z_i, \beta, \gamma, \psi, \rho)] \quad (8)$$

with the indicator function h_{ij} being:

$$h_{ij} = \begin{cases} 1 & \text{if respondent } i \text{ selected outcome } j \\ 0 & \text{otherwise} \end{cases} \quad (i = 1, \dots, N; j = 0, 1, \dots, J) \quad (9)$$

As the estimated coefficients for ordered outcomes are not directly interpretable, marginal effects are further estimated to better understand the impact of one-unit change of the explanatory variables on specific probabilities of activity participation frequency (Harris and Zhao, 2007). Regarding the zero-inflated binary probit equation, the probability to have ever participated in a particular activity for every unit change of an explanatory variable z_k can be computed as:

$$\frac{ME}{\Pr(r = 1)} = \frac{\partial \Pr(r = 1)}{\partial z} = \frac{\partial [\Phi(z'_k \gamma)]}{\partial z} \quad (10)$$

Regarding the ordered probit equation, the overall probabilities for J categories of participation frequency (i.e.: marginal effects) for every unit change of an explanatory variable z_k or x_k can be computed as:

$$\frac{ME}{\Pr(y = j)} = \frac{\partial \Pr(y = j)}{\partial x} = \frac{\partial [\Phi_2(z'_k \gamma, \psi_j - x'_k \beta; -\rho) - \Phi_2(z'_k \gamma, \psi_{j-1} - x'_k \beta; -\rho)]}{\partial x} \quad (11)$$

Social capital measures

In addition to the activity variety and frequency, social capital was measured by 1) position generator, 2) resource generator and 3) core network size. The *position generator*, a list of 22 occupations described in Hampton et al. (2009), was used to measure access to instrumental social resources. Respondents were asked to indicate if they personally knew someone (a relative, friend, or acquaintance) with that occupation. Survey instruments to develop the social capital measures were described in detail in Mannering et al. (2019). Using the position generator, the instrument construct of social capital has the following composition:

Instrumental composite = 0.412* network occupational volume + 0.503* network occupational highest reach + 0.681* network occupational range + 0.338* instrumental resource volume

To explore the availability of resources that individuals can access through their social network, a *resource generator* including 26 resources (Joye et al., 2019) was included in the questionnaire. Respondents were advised: “This section is about who you would turn to for help, if you needed it, in different situations. For each situation, please choose who you would turn to first for help.” The *core network size* is an indicator of accessed social support and obtained by the question: “From time to time, most people discuss important matters with other people. Looking back over the last three months, think about the people whom you discussed matters that are important to you. How many people were you able to recall?” This core network size was a generalized version of Burt’s name generator in the General Social Survey (Burt 1984).

After each resource is ordered by the social network member’s level of support, a confirmatory factor analysis for categorical variables for the aforementioned 11-item resource generator is utilized to obtain three latent variables of social support as follows:

Practical = 1.00a + 1.22b + 1.16c

Emotional = 1.00d + 1.02e + 1.20f + 0.92g

Composite = 1.00Practical + 1.14Emotional + 0.97Strong tie

The two indicators for instrumental and expressive support were subsequently used as explanatory variables in the hierarchical models.

ESTIMATION RESULTS

As stated in this research’s second hypothesis on the frequency of leisure activities that are social in nature, the range of affiliation score (described in Tinsley and Eldredge (1995) as the fulfillment of the need to be around others in an enjoyable and cooperative setting rather than to be alone) is employed in this study to classify the level of sociability for each activity.

Tinsley and Eldredge (1995) defined the affiliation scale as ranging from “gratification of the need to be with and relate to others in a cooperative, enjoyable way [(high score)] vs. the need to do things alone [(low score)].” The twenty most popular activities encompass a full spectrum of affiliation scores from the highest score of 72 for visiting family and friends to the lowest score of 30 for reading non-fiction.

In order to distinguish the impacts of social capital and social support after accounting for other individual/household characteristics on the participation likelihood and frequency of a particular activity, the model estimation results of the social capital and social support measures are summarized in Table 8.

Table 8. Estimation results of zero-inflated ordered probit models for 20 activities

Activity	Affiliation Score	Participation Likelihood		Participation Frequency	
		Expressive	Instrumental	Expressive	Instrumental
Visit family	72	-0.257	2.328	1.529	-0.510
Drink & socialize	67	1.609	-2.951	-0.072	1.329
Attend church	65	-1.350	0.081	0.178	0.982
Video games	55	-0.472	1.783	0.905	-1.145
Dine out	52	0.861	-1.337	-0.068	0.890
Board games	50	0.632	2.317	1.020	0.132
Play cards	50	3.434	-2.969	0.058	0.814
Nature walks	49	-0.248	1.335	0.519	0.283
Photography	45	-1.664	1.281	1.394	-0.529
Watch football	45	-0.736	1.753	1.039	-1.536
Movie theater	44	-0.938	2.058	0.655	-0.871
Bake cook	43	0.431	1.838	0.706	-0.200
Joyriding	43	1.636	-1.163	-0.332	0.589
Computer games	42	-0.540	1.192	0.522	-0.386
House plants	40	-1.270	0.708	0.524	0.424
Radio listen	37	0.403	-0.234	0.868	0.629
Read fiction	37	1.404	-2.813	-0.449	1.332
Play puzzles	33	0.269	0.303	-0.660	-0.137
Read news	33	1.332	-2.750	-0.630	1.870
Read non-fiction	30	-0.056	0.731	0.205	0.517

Bold numbers indicate significance level at 90% or more.

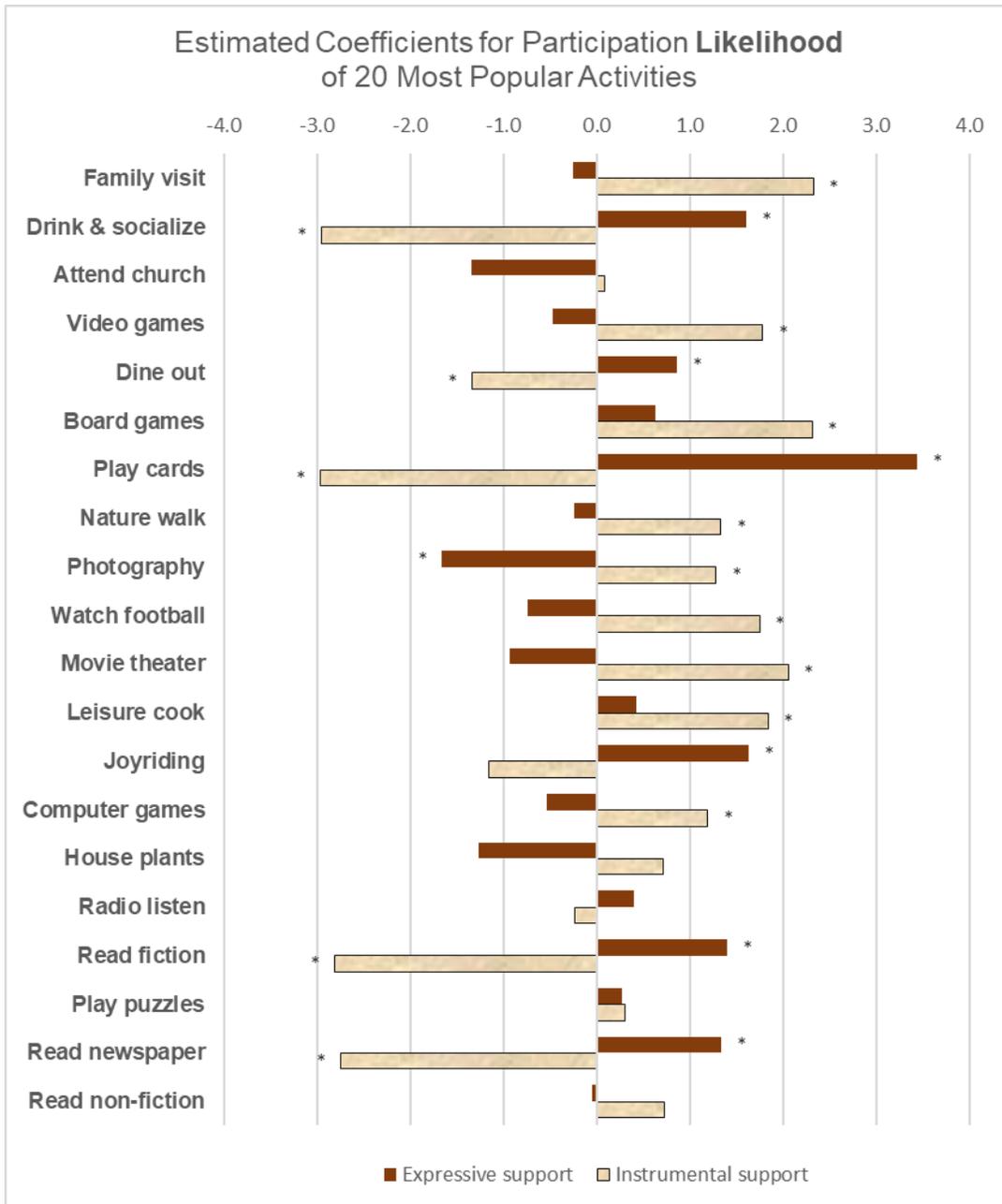
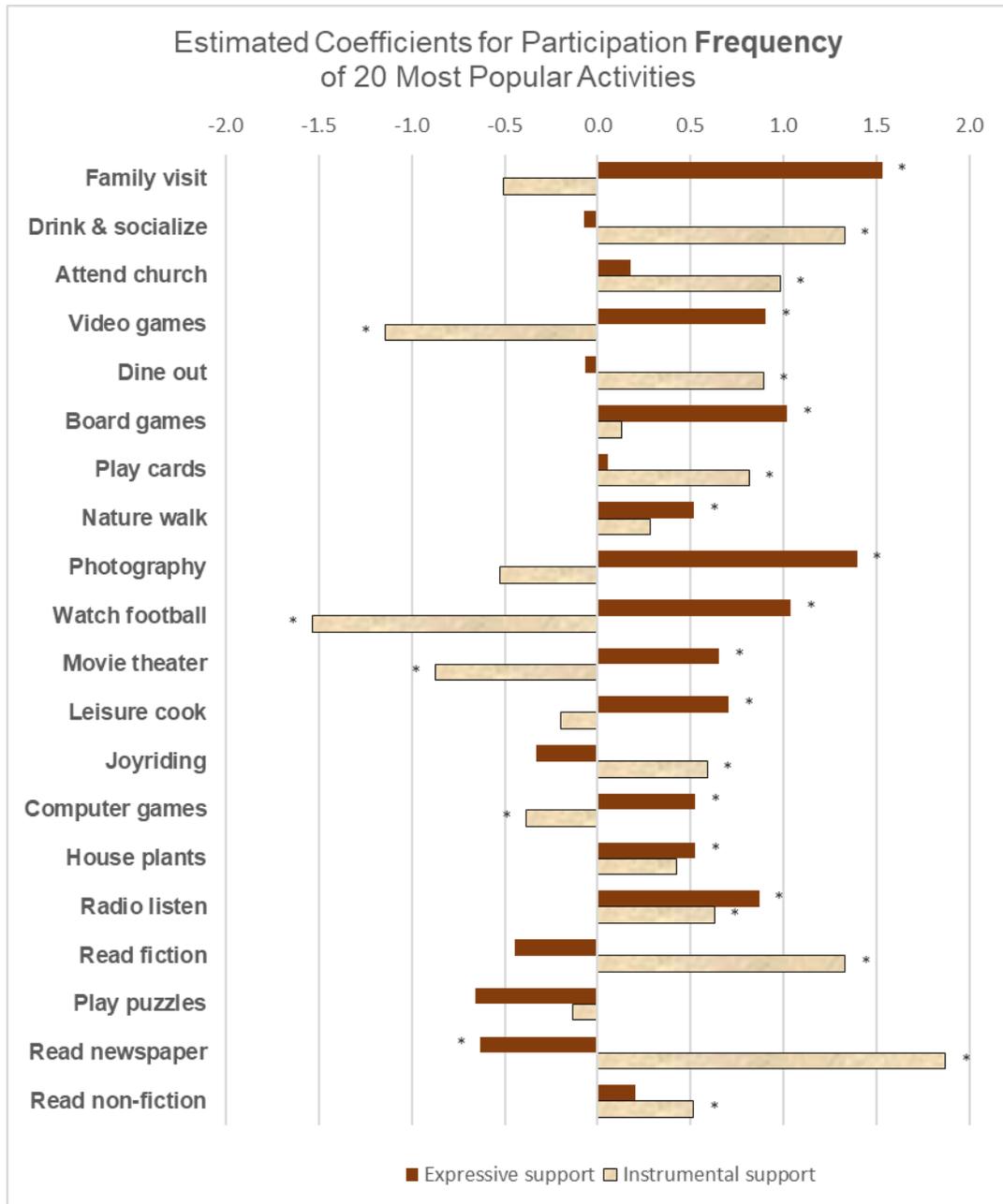


Figure 20. Effects of expressive and instrumental support on participation likelihood
 Asterisks indicate significance level at 90% or more.

Figure 20 illustrates the coefficients of the binary probit part in the 20 ZIOPC models estimated for each of the 20 leisure activities.



Asterisks indicate significance level at 90% or more.

Figure 21. Effects of expressive and instrumental support on participation frequency

Effects of expressive support on participation frequency

Eleven activities—visiting friends and relatives, playing video games, playing board games, taking nature walk, photography, watching football, going to the movie theater, leisure cooking, playing computer games, gardening house plants, and listening to the radio—all have significant and positive effect of expressive support in increasing the participation frequency (Figure 21).

Expressive support has insignificant and minimal effects on two activities with high affiliation scores—drinking/socializing and attending church. While the negative correlation

between expressive and a decreased participation frequency in drinking and socializing can stem from two reasonings. First, increased drinking may be socially discouraged from a healthy and safety viewpoint. No other leisure activities in our list pose any negative health effect if participated in higher frequencies. As driving under the influence has also gained substantial attention in the field of transportation safety, the possible negative impact of drinking on social capital can be further accounted. The second unobserved effects can be due to the wording of the activity for including both drinking and socializing. Some people may drink but do not socialize, and some may socialize but do not drink. The compounded meaning of this activity description suggests an improvement in future research for ensuring single interpretation of each survey instrument. It is worth noting that although social support has a negative correlation with increased frequency of drinking and socializing at 88% confidence level, social support is a strong and statistically significant at 99% confidence level for enabling the participation in this activity (i.e.: someone with higher social support is more likely to drink and socialize at least once over the last three months). Church attending frequency may be dictated by a fixed schedule (shown as the highest percentage of once per week).

Expressive support insignificant effects on increasing the participation frequency of activities with low or moderate affiliation scores, such as dining out, playing cards, joyriding, reading fiction/non-fiction, and playing puzzles.

Effects of instrumental support on participation frequency

In contrast to expressive support, instrumental support has statistically significant and strong positive effects on increasing the frequency of activities with low or moderate affiliation scores, such as gardening house plants, listening to the radio, reading newspaper/magazines, and reading fiction/non-fiction.

On the other hand, social capital has statistically significant but negative effects on the increased frequency of highly social activities, such as playing computer/video games, going to a movie theater, and watching football.

Social capital has statistically insignificant effects on the participation frequency of visiting friends and relatives, leisure baking/cooking, playing puzzles, and photography.

CONCLUSION

By examining twenty most selected activities using ZIOPC models, this study found support for social capital's influence on the increased frequency of leisure activity participation besides sociodemographic factors. Individuals with higher levels of expressive support participate in activities that are social in nature more often than others with lower levels of expressive support. Individuals with higher expressive support also have higher participation frequencies for activities that can be done individually such as gardening house plants and listening to the radio. In contrast, instrumental support has mixed effects (i.e.: positive, negative or insignificant) on increasing frequency of social activities.

One of the main limitations of this study is the independent modeling framework of each chosen activity. These separate models have not been able to capture the correlation and interdependency of one's comprehensive activity space. This analysis can be enhanced by other modeling techniques such as multivariate random parameters zero-inflated order probit models. The effects can also be compared with hierarchical ordered probit models with heterogeneous thresholds for the six participation frequency categories.

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APPENDIX A1

Survey Questions in 2019 Survey Leisure Activity-Social Capital Informed Consent to Participate in Research

Information to Consider Before Taking Part in this Research Study

Pro # 00037263

Researchers at the University of South Florida (USF) study many topics. To do this, we need the help of people who agree to take part in a research study. This form tells you about this research study. We are asking you to take part in a research study that is called: Emerging econometric and data collection methods for capturing attitudinal and social factors in activity and travel behavior modeling. The person who is in charge of this research study is Dr. Michael Maness. This person is called the Principal Investigator.

This study is sponsored by the US Department of Transportation.

Purpose of the Study

This survey is part of a study about how activity participation is impacted by travel and social support. The purpose of the project is to expand knowledge about how activity needs impact travel decisions.

Why are you being asked to take part?

We are asking you to take part in this research study because you are a transportation user in the United States.

Study Procedures

If you take part in this study, you will be asked to complete an online questionnaire with an estimated completion time of 15 minutes. The survey is comprised of four parts: your activity preferences, access to social resources, and basic information about yourself and your household.

Alternatives / Voluntary Participation / Withdrawal

You should only take part in this study if you want to volunteer; you are free to participate in this research or withdraw at any time. There will be no penalty or loss of benefits you are entitled to receive if you stop taking part in this study.

Benefits and Risks

We are unsure if you will receive any benefits by taking part in this research study. This research is considered to be minimal risk.

Compensation

You will be compensated the amount you agreed upon before you entered into the survey.

Privacy and Confidentiality

We will do our best to keep your records private and confidential. We cannot guarantee absolute confidentiality. Your personal information may be disclosed if required by law. It is possible,

although unlikely, that unauthorized individuals could gain access to your responses because you are responding online.

Certain people may need to see your study records. The only people who will be allowed to see these records are: Michael Maness, Principal Investigator The University of South Florida Institutional Review Board (IRB) US Department of Transportation

It is possible, although unlikely, that unauthorized individuals could gain access to your responses. Confidentiality will be maintained to the degree permitted by the technology used. No guarantees can be made regarding the interception of data sent via the Internet. However, your participation in this online survey involves risks similar to a person's everyday use of the Internet. If you complete and submit an anonymous survey and later request your data be withdrawn, this may or may not be possible as the researcher may be unable to extract anonymous data from the database.

We may publish what we learn from this study. If we do, we will not include your name. We will not publish anything that would let people know who you are.

Your personal information collected for this research will be kept as long as it is needed to conduct this research. Once your participation in the research is over, your information will be stored in accordance with applicable policies and regulations. Your permission to use your personal data will not expire unless you withdraw it in writing. You may withdraw or take away your permission to use and disclose your information at any time. You do this by sending written notice to the Principal Investigator at the following address:

Michael Maness
University of South Florida
4202 E Fowler Ave, ENB 118
Tampa, FL 33620

While we are conducting the research study, we cannot let you see or copy the research information we have about you. After the research is completed, you have a right to see the information about you, as allowed by USF policies.

If you have concerns about the use or storage of your personal information, you have a right to lodge a complaint with the data supervisory authority in your country.

Contact Information

If you have any questions about your rights as a research participant, please contact the USF IRB at (813) 974-5638 or contact by email at RSCH-IRB@usf.edu. If you have questions regarding the research, please contact the Principal Investigator at (813) 974-6144 or by email at manessm@usf.edu.

You can print a copy of this consent form for your records.

I freely give my consent to take part in this study. I understand that by proceeding with this survey that I am agreeing to take part in research and I am 18 years of age or older.

Skip To: End of Block If Informed Consent to Participate in Research Information to Consider Before Taking Part in this Re... != 1

Introduction

Thank you for participating in this study. We are asking you to take part in a research project that examines the kinds of activities that people participate in. Specifically, we would like to learn more about which activities you perform and the factors that may limit your participation in those activities.

After the initial screening question, we will ask you about the variety of leisure activities you participated in recently. Then we will ask to learn more about the people you interact with and how they support you. And we will conclude by learning more about the limitations that your household, work, and travel options may play in your leisure activity choices.

EmployStatus Are you now employed full-time, part-time, retired, or not employed for pay?

- Employed full-time
- Employed part-time
- Retired
- Student (and not employed for pay)
- Disabled (and not employed for pay)
- Not employed for pay
- Other

Gender What is your gender?

- Female
- Male
- Not listed

Leisure_Intro

Over the next four pages, we will ask you about the leisure activities that you enjoy to participate in. (Note: The activities listed are quite specific, so please refrain from counting activities that are similar but not exactly the same)

ActList1 Which of the following activities have you performed in the last three (3) months?

- Attending church
- Attending religious group meetings
- Attending social group meetings
- Baking and cooking for leisure
- Dining out
- Drinking and socializing
- Bowling
- Baseball
- Softball
- Volleyball
- Frisbee
- Golf
- Reading fiction
- Reading newspapers and magazines
- Reading nonfiction
- Reading science fiction
- Riding horseback
- Roller skating
- Sailing
- Soccer
- Volunteer: medical setting
- Volunteer: scouting

ActList2 Which of the following activities have you performed in the last three (3) months?

- Art shows and galleries
- Attending sports club meetings
- Bicycling
- Jogging
- Dancing
- Ceramics
- Macrame
- Needlepoint
- Quilting
- Drawing
- Painting
- Photography
- Playing guitar
- Playing piano
- Shooting pool
- Racquetball
- Tennis
- Swimming
- Downhill skiing
- Water skiing
- Weight lifting
- Woodworking

ActList3 Which of the following activities have you performed in the last three (3) months?

- Acting on stage
- Board gaming
- Checkers
- Chess
- Bingo
- Cards
- Bridge
- Poker
- Gambling
- Collecting antiques
- Collecting autographs
- Collecting books
- Collecting coins
- Collecting photographs
- Collecting stamps
- Gardening: community gardens
- Gardening: house plants
- Gardening: vegetable
- Going to a movie theater
- Watching basketball
- Watching football

ActList4 What other activities have you performed in the last three (3) months?

- Attending plays
- Attending popular musical performances
- Attending festivals and parades
- Camping
- Backpacking
- Hiking
- Hunting
- Picnicking
- Nature walks
- Driving for pleasure (joyriding)
- Canoeing
- Fishing: lake
- Fishing: ocean
- Fishing: river and stream
- Radio listening
- Singing karaoke
- Computer games
- Video games (not computer)
- Visiting amusement parks / theme parks
- Visiting friends and relatives
- Working puzzles

If ActivityList1 q://QID89/SelectedChoicesCount Is Greater Than 0

Carry Forward Selected Choices from "Which of the following activities have you performed in the last three (3) months?"

ActFreq_Choice: Over the last three months, how often did you participate in each selected activity?

	Once	Twice	Once per Month	2-3 Times per Month	Once per Week	More than Once per Week
Attending church	<input type="radio"/>					
Attending religious meetings	<input type="radio"/>					
Attending social meetings	<input type="radio"/>					
Leisure baking and cooking	<input type="radio"/>					
Dining out	<input type="radio"/>					
Drinking and socializing	<input type="radio"/>					
Bowling	<input type="radio"/>					
Baseball	<input type="radio"/>					
Softball	<input type="radio"/>					
Volleyball	<input type="radio"/>					
Frisbee	<input type="radio"/>					
Golf	<input type="radio"/>					
Reading fiction	<input type="radio"/>					
Reading newspapers and magazines	<input type="radio"/>					
Reading nonfiction	<input type="radio"/>					
Reading science fiction	<input type="radio"/>					
Riding horseback	<input type="radio"/>					
Roller skating	<input type="radio"/>					
Sailing	<input type="radio"/>					
Soccer	<input type="radio"/>					
Volunteer: medical setting	<input type="radio"/>					
Volunteer: scouting	<input type="radio"/>					

	Once	Twice	Once per Month	2-3 Times per Month	Once per Week	More than Once per Week
Art shows and galleries	<input type="radio"/>					
Attending sports club meetings	<input type="radio"/>					
Bicycling	<input type="radio"/>					

Jogging	<input type="radio"/>					
Dancing	<input type="radio"/>					
Ceramics	<input type="radio"/>					
Macrame	<input type="radio"/>					
Needlepoint	<input type="radio"/>					
Quilting	<input type="radio"/>					
Drawing	<input type="radio"/>					
Painting	<input type="radio"/>					
Photography	<input type="radio"/>					
Playing guitar	<input type="radio"/>					
Playing piano	<input type="radio"/>					
Shooting pool	<input type="radio"/>					
Racquetball	<input type="radio"/>					
Tennis	<input type="radio"/>					
Swimming	<input type="radio"/>					
Downhill skiing	<input type="radio"/>					
Water skiing	<input type="radio"/>					
Weight lifting	<input type="radio"/>					
Woodworking	<input type="radio"/>					

	Once	Twice	Once per Month	2-3 Times per Month	Once per Week	More than Once per Week
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Acting on stage	<input type="radio"/>					
Board gaming	<input type="radio"/>					
Checkers	<input type="radio"/>					
Chess	<input type="radio"/>					
Bingo	<input type="radio"/>					
Cards	<input type="radio"/>					
Bridge	<input type="radio"/>					
Poker	<input type="radio"/>					
Gambling	<input type="radio"/>					
Collecting antiques	<input type="radio"/>					
Collecting autographs	<input type="radio"/>					
Collecting books	<input type="radio"/>					
Collecting coins	<input type="radio"/>					
Collecting photographs	<input type="radio"/>					
Collecting stamps	<input type="radio"/>					

Gardening: community gardens	<input type="radio"/>					
Gardening: house plants	<input type="radio"/>					
Gardening: vegetable	<input type="radio"/>					
Going to a movie theater	<input type="radio"/>					
Watching basketball	<input type="radio"/>					
Watching football	<input type="radio"/>					
	Once	Twice	Once per Month	2-3 Times per Month	Once per Week	More than Once per Week
Attending plays	<input type="radio"/>					
Attending popular musical performances	<input type="radio"/>					
Attending festivals/parades	<input type="radio"/>					
Camping	<input type="radio"/>					
Backpacking	<input type="radio"/>					
Hiking	<input type="radio"/>					
Hunting	<input type="radio"/>					
Picnicking	<input type="radio"/>					
Nature walks	<input type="radio"/>					
Driving for pleasure (joyriding)	<input type="radio"/>					
Canoeing	<input type="radio"/>					
Fishing: lake	<input type="radio"/>					
Fishing: ocean	<input type="radio"/>					
Fishing: river and stream	<input type="radio"/>					
Radio listening	<input type="radio"/>					
Singing karaoke	<input type="radio"/>					
Computer games	<input type="radio"/>					
Video games (not computer)	<input type="radio"/>					
Visiting amusement parks / theme parks	<input type="radio"/>					
Visiting friends and relatives	<input type="radio"/>					
Working puzzles	<input type="radio"/>					

PosGen1 In this section, we are interested in how the people you know help to make your life better and aid you in times of need.

This question is about types of jobs and whether people you know hold such jobs. These people include people you know on a first-name basis who are relatives, friends, and acquaintances. For each profession below, please indicate if you personally know someone (a relative, friend, or acquaintance) with that profession.

	Know Someone	Do Not Know Someone
Nurse	<input type="radio"/>	<input type="radio"/>
Farmer	<input type="radio"/>	<input type="radio"/>
Lawyer	<input type="radio"/>	<input type="radio"/>
Middle School Teacher	<input type="radio"/>	<input type="radio"/>
Full-time Babysitter or Nanny	<input type="radio"/>	<input type="radio"/>
Janitor	<input type="radio"/>	<input type="radio"/>
Personnel Manager	<input type="radio"/>	<input type="radio"/>
Hair Dresser	<input type="radio"/>	<input type="radio"/>
Bookkeeper	<input type="radio"/>	<input type="radio"/>
Production Manager	<input type="radio"/>	<input type="radio"/>
Operator in a Factory	<input type="radio"/>	<input type="radio"/>

PosGen2 For each profession below, please indicate if you personally know someone (a relative, friend, or acquaintance) with that profession.

	Know Someone	Do Not Know Someone
Computer Programmer	<input type="radio"/>	<input type="radio"/>
Taxi Driver	<input type="radio"/>	<input type="radio"/>
Professor	<input type="radio"/>	<input type="radio"/>
Police Officer	<input type="radio"/>	<input type="radio"/>
Chief Executive Officer (CEO) of a Large Company	<input type="radio"/>	<input type="radio"/>
Writer	<input type="radio"/>	<input type="radio"/>
Administrative Assistant in a Large Company	<input type="radio"/>	<input type="radio"/>
Security Guard	<input type="radio"/>	<input type="radio"/>
Receptionist	<input type="radio"/>	<input type="radio"/>
Congressman or Congresswoman	<input type="radio"/>	<input type="radio"/>
Hotel Bellhop	<input type="radio"/>	<input type="radio"/>

ResGen1

This section is about who you would turn to for help, if you needed it, in different situations. For each situation, please choose who you would turn to first for help. (If there are several people you are equally likely to turn to, please choose the one who you feel is closest to you)

	Immediate Family	Other Family Member	Close Friend	Neighbor	Someone I Work/Study With	Other Friend or Acquaintance	No One	Can't Choose
Help you for a household or a garden job that you can't do yourself	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>				
Help you around the house if you were sick and had to stay in bed for a few days	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>				
Help you if you needed to borrow a large sum of money	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>				
Help you with finding a job	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>				
Help you if you had problems with your computer that you cannot solve yourself	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>				
Help you with finding a new place to live	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>				
Help you look for information about a serious personal health issue	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>				
Help you if you needed advice on administrative formalities and on other legal matters	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>				
Be there if you felt a bit down or depressed and wanted to talk about it	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>				
Give you advice on family problems	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>				

Make you feel appreciated for who you really are	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>				
Be there if you just wanted to talk about your day	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>				
Look after you if you were seriously ill	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>				
Pick you up from a social event in the evening	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>				
	Immediate Family	Other Family Member	Close Friend	Neighbor	Someone I Work/Study With	Other Friend or Acquaintance	No One	Can't Choose
Is an elected official	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>				
Works at a local government agency (city, town, or county)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>				
Give advice on problems at work	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>				
Knows a lot about government regulations	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>				
Has good contacts at TV/radio/newspaper	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>				
Give advice about money problems	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>				
Can babysit others' children	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>				
Owens a car	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>				
Do your shopping if you are ill	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>				
Watch your home or pets while away	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>				
Provide you a place to stay for a week	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>				
Discuss politics with	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>				

StrongTies_Important From time to time, many people discuss important matters with other people. Looking back over the last three (3) months, how many people did you discuss matters that are important to you?

- 0
- 1
- 2
- 3
- 4
- 5
- 6
- 7
- 8
- 9
- 10 or more

ActHrs Over the last week, how many hours did you devote to each of the following activities in your household? (If you participated in an activity but it was less than one hour, please write 1)

Housework and chores : _____

Food preparation and cleanup : _____

Lawn and garden care : _____

Paying bills and other household paperwork : _____

Grocery shopping : _____

Other shopping for the household : _____

Caring for children in your household : _____

Caring for children from other households : _____

Caring for adults in your household : _____

Caring for adults from other households : _____

Total : _____

JobHrs Over the last week, how many hours did you spend working for a job?

SchoolHrs Over the last week, how many hours did you spend attending school? (Only include the time that you were on campus or in an educational building. If you have online courses, include the time you spend accessing online course content.)

DLicense Do you have a state-issued driver's license?

- Yes
- No

Disability Do you have a disability, condition, or illness that affects your ability to travel in your region?

- Yes
- No

Display This Question:

If Are you now employed full-time, part-time, retired, or are you not employed for pay? = 1

Or Are you now employed full-time, part-time, retired, or are you not employed for pay? = 2

Or Are you now employed full-time, part-time, retired, or are you not employed for pay? = 4

Or Are you now employed full-time, part-time, retired, or are you not employed for pay? = 7

CommuteMode How do you typically travel to work or school?

(If you use more than one mode, choose the mode that you use over the longest time period of your commute.)

- Walk (or jog/wheelchair)
- Bicycle
- Drive alone
- Carpool with only family/household member(s)
- Carpool with person(s) not in household
- Bus (public transit)
- Light Rail or Metro/Subway
- Streetcar/Trolley
- Private shuttle or bus (provided by employer/school)
- Paratransit
- Taxi or Cab
- Uber, Lyft, or other ridehailing service
- Motorcycle/moped/scooter
- Other mode
- Work from home regularly

Display This Question:

If Are you now employed full-time, part-time, retired, or are you not employed for pay? = 1

Or Are you now employed full-time, part-time, retired, or are you not employed for pay? = 2

Or Are you now employed full-time, part-time, retired, or are you not employed for pay? = 4

Or Are you now employed full-time, part-time, retired, or are you not employed for pay? = 7

CommuteTime_Work In minutes, how long is your typical round-trip commute from home to work?

(Note: please include the time it takes you to travel to and complete any other tasks you typically do during your commute, such as dropping off children, waiting, and eating out)

Display This Question:

If Are you now employed full-time, part-time, retired, or are you not employed for pay? = 4

CommuteTime_School In minutes, how long is your typical round-trip commute from home to school?

(Note: please include the time it takes you to travel to and complete any other tasks you typically do during your commute, such as dropping off children, waiting, and eating out)

BikeFreq

How often do you use a bicycle?

- 6-7 days a week
- 5 days a week
- 4 days a week
- 2-3 days a week
- 1 day a week
- 1-3 days per month
- Less than monthly
- Never
- I do not have access to a bicycle or bikesharing services

UberFreq How often do you use a ridehailing service (e.g. Lyft, Uber)?

- 6-7 days a week
- 5 days a week
- 4 days a week
- 2-3 days a week
- 1 day a week
- 1-3 days per month
- Less than monthly
- Never
- Ridehailing services are not available in my area

TransitFreq How often do you use transit (e.g. bus, light rail, metro/subway)?

- 6-7 days a week
- 5 days a week
- 4 days a week
- 2-3 days a week
- 1 day a week
- 1-3 days per month
- Less than monthly
- Never
- Transit services are not available in my area

HouseholdSize A household consists of one or more people who live in the same dwelling. Often, it may consist of a single family, but also other groupings of people. All members can access the dwelling through the same entrance.

How many people (including yourself) live in your household?

- 1 (Live Alone)
- 2
- 3
- 4
- 5
- 6
- 7
- 8
- 9
- 10 or more

WorkerNo How many full-time and part-time workers (including yourself) are there in your household?

- 0
- 1
- 2
- 3
- 4
- 5
- 6
- 7
- 8
- 9
- 10 or more

VehNo How many motorized vehicles (including four-wheelers and two-wheelers) are available in your household?

- 0 (No Vehicles in Household)
- 1
- 2
- 3
- 4
- 5 or more

Age_HHMembers How many people in your household (including yourself) fit in the following age groups?

	Number of Household Members
Under 5	
5-15	
16-17	
18-21	
21-34	
35-54	
55-64	
65-74	
75 or older	

WalkTime_Restaurant How long would it take you **to walk** from your home to the closest sit-down restaurant?

- Less than 10 minutes
- 10-20 minutes
- More than 20 minutes
- Not possible to walk
- I do not know

DriveTime_Restaurant How long would it take someone **to drive** from your home to the closest sit-down restaurant?

- Less than 5 minutes
- 5-10 minutes
- More than 10 minutes
- I do not know

HomeType What type of place is your current residence?

- Single-family house (detached house)
- Townhouse, rowhouse, or duplex (attached house)
- Apartment
- Condo
- Mobile home/trailer
- Dorm or barracks
- Retirement or senior housing
- Other (e.g., boat, RV, van)

Display This Question:

If What type of place is your current residence? = 3

AptUnits How many apartments are there in your building?

- Four or fewer
- Five or more

Display This Question:

If What type of place is your current residence? = 4

CondoUnits How many condo units are there in your building?

- Four or fewer
- Five or more

HomeTenure Do you rent or own your home?

- Rent
- Own
- Provided by somebody else (e.g., relative, employer)

Other (please specify): _____

Zipcode In what zipcode is your household located? _____

Education What is the highest level of education you have completed?

- Less than high school
- High school graduate/GED
- Some college, no degree
- Vocational/technical training
- Associate's degree
- Bachelor's degree
- Graduate/post-graduate degree

MaritalStatus Which of the following best describes your current marital/relationship status?

- Married, or in a domestic partnership
- Widowed
- Divorced
- Separated
- Living with a partner
- Never been married
- Birthyear In what year were you born?

Race Which category best describes you? Select all that apply.

- American Indian or Alaska Native
- Asian
- Black or African American
- Middle Easterner or North African
- Native Hawaiian or other Pacific Islander
- White
- Other race, ethnicity, or origin
- Prefer not to answer

Hispanic Are you of Hispanic, Latino, or Spanish origin?

- Yes
- No

Income What was your household's total annual income (before taxes) last year?

- Under \$15,000
- \$15,000–\$24,999
- \$25,000–\$34,999
- \$35,000–\$49,999
- \$50,000–\$74,999
- \$75,000–\$99,999
- \$100,000–\$149,999
- \$150,000–\$199,999
- \$200,000–\$249,999
- \$250,000 or more

BigFive Here are a number of personality traits that may or may not apply to you. Please choose the extent to which you agree or disagree with that statement. You should rate the extent to which the pair of traits applies to you, even if one characteristic applies more strongly than the other.

I see myself as:

	Disagree strongly	Disagree moderately	Disagree a little	Neither agree nor disagree	Agree a little	Agree moderately	Agree strongly
Extraverted, enthusiastic	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Critical, quarrelsome	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Dependable, self-disciplined	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Anxious, easily upset	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Open to new experiences, complex	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Reserved, quiet	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Sympathetic, warm	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Disorganized, careless	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Calm, emotionally stable	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Conventional, uncreative	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

APPENDIX A2

Additional Questions in 2020 Survey

Leisure Activity Change, Plan with People, Well-being, and Pandemic in the 2020 Survey

Top20_Acts_Change Since April 2020, how has your frequency of participating in the following activities changed?

	Less	About the same	More
<i>Display This Choice:</i>			
<i>If ActivityList1 = 1</i>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Attending church			
<i>Display This Choice:</i>			
<i>If ActivityList1 = 4</i>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Baking and cooking for leisure			
<i>Display This Choice:</i>			
<i>If ActivityList3 = 2</i>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Board gaming			
<i>Display This Choice:</i>			
<i>If ActivityList3 = 6</i>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Cards			
<i>Display This Choice:</i>			
<i>If ActivityList4 = 17</i>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Computer games			
<i>Display This Choice:</i>			
<i>If ActivityList1 = 5</i>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Dining out			
<i>Display This Choice:</i>			
<i>If ActivityList1 = 6</i>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Drinking and socializing			
<i>Display This Choice:</i>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

If ActivityList4 = 10

Driving for pleasure (joyriding)

Display This Choice:

If ActivityList3 = 17

Gardening: house plants

Display This Choice:

If ActivityList3 = 21

Going to a movie theater

Display This Choice:

If ActivityList4 = 9

Nature walks

Display This Choice:

If ActivityList2 = 12

Photography

Display This Choice:

If ActivityList4 = 15

Radio listening

Display This Choice:

If ActivityList1 = 13

Reading fiction

Display This Choice:

If ActivityList1 = 14

Reading newspapers and
magazines

Display This Choice:

If ActivityList1 = 15

Reading nonfiction

Display This Choice:

If ActivityList4 = 18

Video games (not computer)

Display This Choice:

If ActivityList4 = 20

Visiting friends and relatives

Display This Choice:

If ActivityList3 = 20

Watching football

Display This Choice:

If ActivityList4 = 21

Working puzzles

ActLocation_Freq Over the last three (3) months, how often did you participate in **leisure activities** in the following ways?

Display This Choice:

If A household consists of one or more people who live in the same dwelling. Often, it may consist of... != 2

	None	Once	Twice	Once per month	2-3 times per month	Once per week	More than once per week
Having online/virtual activities at my home	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>				
Exercising with people from other households	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>				
Leisure at my home with people from other households	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>				

Traveling alone
to/from leisure at
someone else's
home

*Display This
Choice:*

*If A
household consists
of one or more
people who live in
the same dwelling.
Often, it may
consist o... != 2*

Traveling with
your household
member(s) to
leisure at someone
else's home

Gathering in
groups of 10 or
more people

Plan_wPeople Since April 2020, how have you changed the way you **plan** or **perform** leisure activities with the following people compared to before the COVID-19 pandemic?

Display This Choice:

If A household consists of one or more people who live in the same dwelling. Often, it may consist o... != 2

Display This Choice:

If Are you now employed full-time, part-time, retired, or are you not employed for pay? = 1

Or Are you now employed full-time, part-time, retired, or are you not employed for pay? = 2

Display This Choice:

If Are you now employed full-time, part-time, retired, or are you not employed for pay? = 4

Much less Somewhat less About the same Somewhat more Much more

Display This Choice:

If A household consists of one or more people who live in the same dwelling. Often, it may consist o... != 2

Household members

Immediate family who do not live with you

Close friends

Neighbors

Other family members

Other friends or acquaintances

Display This Choice:

If Are you now employed full-time, part-time, retired, or are you not employed for pay? = 1

Or Are you now employed full-time, part-time, retired, or are you not employed for pay? = 2

Coworkers

Display This Choice:

If Are you now employed full-time, part-time, retired, or are you not employed for pay? = 4

Class/Schoolmates

Individuals aged 65 and over

Isolation_ISSP How often in the past 4 weeks have you felt that:

	Never	Rarely	Sometimes	Often	Very often	Can't choose
you lack companionship?	<input type="radio"/>					
you are isolated from others?	<input type="radio"/>					
you are left out?	<input type="radio"/>					

SWLS_Diener Below are five statements with which you may agree or disagree. Please indicate your response for each statement.

	Strongly disagree	Disagree	Slightly disagree	Neutral	Slightly agree	Agree	Strongly agree
In most ways my life is close to my ideal.	<input type="radio"/>						
The conditions of my life are excellent.	<input type="radio"/>						
I am satisfied with my life.	<input type="radio"/>						
So far I have gotten the important things I want in life.	<input type="radio"/>						
If I could live my life over, I would change almost nothing.	<input type="radio"/>						

Flourishing_Scale_Diener Below are nine statements with which you may agree or disagree. Please indicate your response for each statement.

	Strongly disagree	Disagree	Slightly disagree	Mixed or neutral	Slightly agree	Agree	Strongly agree
I lead a purposeful and meaningful life.	<input type="radio"/>						
My social relationships are supportive and rewarding.	<input type="radio"/>						
I am engaged and interested in my daily activities.	<input type="radio"/>						
I actively contribute to the happiness and well-being of others.	<input type="radio"/>						
I am competent and capable in the activities that are important to me.	<input type="radio"/>						
I am a good person and live a good life.	<input type="radio"/>						
I am optimistic about my future.	<input type="radio"/>						
People respect me.	<input type="radio"/>						
I am not reading the questions of this survey.	<input type="radio"/>						

Pandemic_EIS How much has your well-being and functioning been **different** in the following ways **in the past 4 weeks**, compared to the way it was **before the beginning of the COVID-19 pandemic** in the U.S.?

	Not at all	A little bit	Moderately	A lot	Extremely
More worried about my finances	<input type="radio"/>				
More anxious or ill at ease	<input type="radio"/>				
More difficulty concentrating	<input type="radio"/>				
Being less productive	<input type="radio"/>				
More worried about my personal health and safety	<input type="radio"/>				
Being more bored	<input type="radio"/>				
More difficulty sleeping	<input type="radio"/>				
Feeling more down or depressed	<input type="radio"/>				
More worried about the health and safety of family members or friends	<input type="radio"/>				
Feeling more frustrated about not being able to do what I usually enjoy doing	<input type="radio"/>				
More worried about possible breakdown of society	<input type="radio"/>				
Feeling more angry or irritated	<input type="radio"/>				
Feeling that the future seems darker or scarier than before	<input type="radio"/>				
Feeling more grief or sense of loss	<input type="radio"/>				