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US trends in social isolation, social engagement, and companionship - nationally and by age, sex, race/ethnicity, family income, and work hours, 2003–2020

Viji Diane Kannan [a,*], Peter J. Veazie [b]

[a] Department of Psychiatry, University of Rochester, 300 Crittenden Boulevard, Rochester, NY 14642, USA
[b] Department of Public Health Sciences, University of Rochester, 265 Crittenden Blvd., Rochester, NY 14642, USA

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ABSTRACT

Social connectedness is essential for health and longevity, while isolation exacts a heavy toll on individuals and society. We present U.S. social connectedness magnitudes and trends as target phenomena to inform calls for policy-based approaches to promote social health. Using the 2003–2020 American Time Use Survey, this study finds that, nationally, social isolation increased, social engagement with family, friends, and 'others' (roommates, neighbors, acquaintances, coworkers, clients, etc.) decreased, and companionship (shared leisure and recreation) decreased. Joinpoint analysis showed that the pandemic exacerbated upward trends in social isolation and downward trends in non-household family, friends, and 'others' social engagement. However, household family social engagement and companionship showed signs of progressive decline years prior to the pandemic, at a pace *not* eclipsed by the pandemic. Work hours emerged as a structural constraint to social engagement. Sub-groups allocated social engagement differently across different relationship roles. Social engagement with friends, others, and in companionship plummeted for young Americans. Black Americans experienced more social isolation and less social engagement, overall, relative to other races. Hispanics experienced much less social isolation than non-Hispanics. Older adults spent more time in social isolation, but also relatively more time in companionship. Women spent more time with family while men spent more time with friends and in companionship. And, men's social connectedness decline was steeper than for women. Finally, low-income Americans are more socially engaged with 'others' than those with higher income. We discuss potential avenues of future research and policy initiatives that emerge from our findings.

1. Introduction

Humans are one of the most social of all animals (Tomasello, 2014) and seek frequent, on-going social engagement (Baumeister & Leary, 1995). Social isolation (i.e., social deficits indicated by infrequent or insufficient engagement with others) is linked to decrements in health and longevity (Holt-Lunstad, 2020b). Isolated individuals are at elevated risk for *cardiovascular disease* (Hakulinen et al., 2018; Valtorta, Kanaan, Gilbody, Ronzi, & Hanratty, 2016), *dementia* (Penninkilampi, Casey, Singh, & Brodaty, 2018), *infectious disease* (Cohen, 2021), *low functional status* (Fothergill et al., 2011; Shankar, McMunn, Demakakos, Hamer, & Steptoe, 2017), *anxious or depressed mood* (Fothergill et al., 2011), *biological markers of poor health* (e.g., C-reactive protein, fibrinogen levels) (Heffner, Waring, Roberts, Eaton, & Gramling, 2011; Shankar, McMunn, Banks, & Steptoe, 2011), and *mortality* (Holt-Lunstad, Smith, Baker, Harris, & Stephenson, 2015; Holt-Lunstad, Smith, & Layton, 2010) including *overdose* (Schell et al., 2021) and *suicide* (Heuser & Howe, 2019; Trout, 1980). Isolation is comparable to or rivals other well-known mortality risk factors like air pollution, smoking, and inactivity (Holt-Lunstad, 2020b). However, as social engagement increases, health and longevity improve in a dose-response fashion (Yang et al., 2016).

Given the toll on individuals and society, researchers and policy makers have recommended cross-sectoral, policy-based approaches to promote social connectedness (an umbrella term encompassing all measures of social life) (Holt-Lunstad, 2020a; 2020b; United States Congress Joint Economic Committee, 2017). Rather than only targeting the most severely isolated in clinical settings, public policy has the

* Corresponding author.
E-mail addresses: viji_kannan@urmc.rochester.edu (V.D. Kannan), peter_veazie@urmc.rochester.edu (P.J. Veazie).

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potential to generate broad societal improvements in social connectedness across the risk trajectory. Although most interventions to reduce social isolation report some success, currently, evidence for individual-level interventions indicate weak efficacy (Gardiner, Geldenhuys, & Gott, 2018; Holt-Lunstad, 2020b; Marczak et al., 2019; National Academies of Sciences Engineering And Medicine, 2020). However, public policy has the capacity to have a population wide impact and to target vulnerable sub-groups that may be less accessible through individual-level interventions.

For example, preventing tobacco use through smoke-free-air spaces and excise taxes is considered more effective in curbing related diseases across the population than trying to get already addicted individuals to quit smoking. Similarly, identifying public policies that can promote social engagement and prevent isolation would be more effective across the population than simply collecting that information at point of care and addressing the needs of those found to already have high social isolation (Holt-Lunstad, 2018). Furthermore, the influence of these policies varies by sub-group. For example, young, less educated, or Medicaid recipient expectant mothers respond to excises taxes, whereas more educated or high-income mothers respond to smoking bans in restaurants (Markowitz, Adams, Dietz, Tong, & Kannan, 2013).

A public policy approach requires *a priori* establishment of patterns and trends as target phenomena (Hodge, White, & Reeves, 2020; Umberson & Karas Montez, 2010; United States Congress Joint Economic Committee, 2017). Documenting patterns and trends related to social connectedness, nationally and by sub-group, serves as a foundation for theoretical explanations and strategies for effective structural interventions. Trends reveal progress toward goals and how national events like a pandemic affect social connectedness. Sub-group patterns identify populations for targeted interventions and/or further study, and, together with trends, are essential for designing effective structural, policy-based solutions. Although the prevalence and hazard of social isolation is similar to that of most mortality risk factors (Holt-Lunstad, 2020b), social isolation has not received comparable public health attention nor are its magnitudes and trends at the national and sub-group level sufficiently documented. Thus, we report social connectedness magnitudes and trends nationally and examine disparities across population sub-groups.

Studies of social connectedness trends have consisted of a variety of measures that tap into emotional feelings such as loneliness and those that point to frequency of social engagement or number of confidants. Loneliness trends among US adolescents increased in one study covering the years 2000–2018 (Twenge et al., 2021) and decreased in another study from 1991 to 2012 (Clark, Loxton, & Tobin, 2015). Over three decades (1974–2008), Americans' socializing more than once a month increased slightly for friends (from 40% to 43%), remained stable for relatives (around 58%), and decreased for neighbors (from 44% to 31%) (Marsden & Srivastava, 2012). Having no confidant with whom to discuss important matters tripled between 1985 and 2004. However, being able to confide in one's spouse increased over those years (McPherson, Smith-Lovin, & Brashears, 2006; McPherson, Smith-Lovin, & Brashears, 2008). American adolescents experienced declining in-person social interactions with peers between 1976 and 2017 (Twenge, Spitzberg, & Campbell, 2019) and declining leisure time, non-digital social interactions between 2003 and 2017 (Twenge & Spitzberg, 2020).

1.1. The present study

In this study of social connectedness trends, we use a self-reported, continuous measure (number of minutes) that captures an individual's actual amount of social exposure [both isolation (where exposure is zero) and engagement (where exposure is greater than zero)] over the course of a defined time frame (one day). Activities performed over the course of a day were recorded on that day and collected by the interviewer the following day, minimizing recall bias and measurement error. The primary inquiry asks about the duration of each activity, with secondary questions regarding where, when, and with whom the activity took place. Thus, unlike survey items that *directly* ask how much or how frequently people are socially engaged, our data potentially minimizes social desirability bias, since social exposure is not the main focus.

We examine trends in three aspects of social connectedness: (1) *Social Isolation*; (2) *Social Engagement* (with household family, non-household family, friends, and 'others' [neighbors, roommates, acquaintances, clients, coworkers, and other unenumerated roles]); and (3) *Companionship*, which refers to shared leisure for the sake of enjoyment and provides an intrinsic satisfaction that need not serve any extrinsic purpose such as social support (Rook, 1987; Rook & Ituarte, 1999).

For these three aspects of social connectedness, we limit our examination to in-person contact. While a few studies have found benefits to online interaction, there remain aspects of in-person interpersonal interaction (e.g., touch, simultaneous expressions, mutually experienced environment) that cannot be replicated online. Thus, documenting trends specific to in-person social contact is important. Further, understanding changes to in-person social contact aids in determining the extent to which online platforms serve as either a compliment or a substitute to in-person contact.

Additionally, this study does not include the ambient presence of others nor does it include interactions with strangers that the subject might not report as 'being with'. These types of social exposure do, however, offer some benefit. Social baseline theory suggests, at a minimum, being in relatively close proximity to others imparts physiological benefits (Beckes & Coan, 2011; Coan & Sbarra, 2015). And, studies show that interaction with strangers such as chatting with the barista, conversing with a fellow commuter on the bus, or greeting others in public parks, provides hedonic and learning benefits (Atir, Wald, & Epley, 2022; Sandstrom & Dunn, 2014; Schroeder, Lyons, & Epley, 2022; Van Lange & Columbus, 2021). Future research investigating these types of minimal social exposures could shed more light on the dynamics of social connectedness trends.

We present temporal trends nationally and by sub-group in minutes per day for each year from 2003 to 2020. For national trends, we use joinpoint analysis to identify if and when significant changes occurred. Joinpoints serve as a useful tool for comparing trends with national events (e.g., the Great Recession in 2008, the Covid pandemic in 2020). For sub-group analyses, we examine trends by age, given that the trajectory of relational networks and preferences differ by age (Antonucci, Ajrouch, & Birditt, 2014; Carstensen, 2021). We also examine trends by sex, race, ethnicity, and class which represent groups that are frequently treated differently in society with resulting health consequences (Homan, Brown, & King, 2021). And, we examine trends by number of hours worked per week, which is cited in recent labor disputes as preventing workers from developing meaningful relationships (Eidelson, October 25, 2021) and is identified as one of seven structural sectors influencing social life in a recently developed systems-based framework (Holt-Lunstad, 2022). To understand differences in *magnitudes* across sub-groups, we report the *average* minutes per day of social connectedness, by sub-group, for each social connectedness measure, over the 2003–2019 period. And, to understand differences in *trends* across sub-groups, we report the *slope* of the trendlines, by sub-group, for each social connectedness measure, from 2003 to 2019.

2. Methods

2.1. Data

We use the 2003–2020 American Time Use Survey (ATUS), a nationally representative sample of non-institutionalized Americans 15-years and older (Bureau of Labor Statistics, 2021). ATUS collects data on how Americans allocate their time over the course of a single, randomly selected day. Respondents report the duration of each activity

on that day in minutes and with whom the activity took place.

Rather than using scripted questions, interviewers engage in conversation as an interviewing technique to obtain precise, accurate duration of activity measures. This flexible interviewing style allows interviewers to probe in a non-leading way, to guide respondents through memory lapses, and allows respondents to describe their activities with thoroughness. Whether or not the respondent was with anyone when the activity took place is obtained by asking questions like "Who was in the room with you" or "Who accompanied you?" for each activity, excluding sleep, grooming (e.g., bathing), and work. Thus, the ATUS measures indicate *in-person* social engagement.

2.2. Sampling and weights

The ATUS sample is distributed across US states in proportion to each state's population. Black and Hispanic households are oversampled to improve the reliability of time-use data for these demographic groups. The sampling process begins by stratifying households on race/ethnicity, presence and age of children, and number of adults. Next, households are randomly selected for each month. A person at least 15-years of age from each household is then randomly selected. Each month's sample is divided into four randomly selected panels (one for each week of the month). Respondents are then randomly assigned the day of the week for which they will report their time-use.

The sample for each week is split evenly between weekdays and weekends (i.e., 25% for each weekend day, Saturday and Sunday; and, 10% for each weekday, Monday through Friday). When sample weights are applied, all seven days of the week are equally represented at approximately 14.3% each. Holidays comprise 2% of the reported days. Time-use diary reports are available for each day from January 1st, 2003 to December 31st, 2020, except for the day before a holiday. On average, each day contained 35 time-use reports. On average, each year from 2003 to 2019 contained 355 days of time-use data.

The year 2020 contained 305 days of time-use data. ATUS data collection was suspended for 52 days, from March 18, 2020 to May 9, 2020 — a period defined by sheltering in place. However, time-use data is available for the other 10-months of 2020. Thus, the 2020 ATUS data are not representative of a full year. However, ATUS provides a special weight constructed to take into account sampling issues related to the pandemic specifically related to those days that were excluded from 2020 data collection. Nonetheless, we recommend viewing the 2020 results as somewhat underestimating social isolation and overestimating social engagement, given those missing dates during the height of social distancing and quarantine.

Sample weights account for the survey's complex sampling design and for non-response. Application of weights is required for computing estimates with the ATUS data to avoid misleading results. Since some demographic groups and certain days of the week are oversampled, the sample weights ensure that each population subgroup and each day is represented in summary calculations in proportion to the population, the calendar week, and the calendar year. All our analyses use all ATUS weights to ensure national and temporal representativeness. These weights can also be used to estimate quarterly and annual averages (Bureau of Labor Statistics, 2021). ATUS 2003–2020 contains 219,368 respondents.

2.3. Social connectedness measures

Each reported activity includes information on who the respondent was with, if anyone, with the exceptions of: sleeping, grooming (e.g., bathing), and working. Thus, social connectedness variables in this study reflect non-sleep, non-grooming, and non-work time (in minutes) during the course of a single 24-h day.

Social isolation is the total number of minutes spent with noone else. While other people might be in the vicinity of the respondent (e.g., while shopping alone at a grocery store), if the respondent was not "with" any of those people, then the respondent was considered alone.

Social engagement is the total number of minutes the respondent spent with household family members, non-household family members, friends, and 'others' (i.e., roommates, neighbors, acquaintances, co-workers, clients, and other unenumerated roles).

Companionship is the total number of minutes the respondent spent with anyone while engaged in socializing, relaxing, leisure, sports, exercise, recreation, and eating or drinking at a restaurant or bar. Associated travel time for these activities is included if spent with other people. Analyzing companionship presents an opportunity to examine social engagement with regard to leisure activities. These activities were considered companionship only if performed with other people. Thus, social engagement and companionship should not be considered mutually exclusive. Rook describes companionship as *shared* leisure for the sake of enjoyment and proposes that the activities of social engagement that comprise companionship provide an intrinsic satisfaction and a sense of belonging (Rook, 1987; Rook & Ituarte, 1999; Sorkin, Rook, & Lu, 2002).

2.4. Sub-groups

In addition to calculating national social connectedness estimates, we calculated estimates by sex (male, female), race (white, black, other), ethnicity (Hispanic, non-Hispanic), age (15–24, 25–34, 35–44, 45–54, 55–64, ≥65 years), family income (≤$25,000; $25,000–$49,999; $50,000–$99,999; ≥$100,000), and number of hours typically worked per week (none, 1–25, 26–50, 51–100). ATUS collected information on the combined income of all family members over the last year including money from work; net income from business, farm, or rent; pensions; dividends; interest; Social Security payments; and any other money income received by family members. Hours typically worked per week included all jobs. Respondents reporting greater than 100 work hours per week (n = 63) were excluded from this analysis.

2.5. Analysis

2.5.1. National analyses

For *each* year, from 2003 to 2020, we calculate the average number of minutes per day of social connectedness. These are *daily* averages for each year. Thus, a 1-min difference in the annual daily average across years is equivalent to just over 6-h difference in the total *yearly* average. We present these annual daily averages in minutes graphically to show the temporal trend in social connectedness from 2003 to 2020.

National temporal trends were analyzed using the Joinpoint Regression Program, (National Cancer Institute, 2022) which calculates *joinpoints* — years at which statistically significant changes to the slope of the trendlines occur. We used the Weighted BIC Model selection method. The joinpoints connect consecutive linear segments on a log scale drawn through the actual trendlines. The program also calculates the annual percent change (APC) for those linear segments. The program fits the trend data into the simplest model that best summarizes the data. For each APC, the program calculates 95% confidence intervals and tests whether the APC is significantly different from zero at $\alpha = 0.05$, based on a t-distribution. Although, for some linear segments, the program is unable to calculate these statistics; we report these incidents as [test statistics unavailable].

2.5.2. Sub-group analyses

Annual daily averages of social connectedness were calculated by sex, race/ethnicity, age, family income, and hours worked per week and presented as trendlines. For family income, the annual daily averages are adjusted for age, sex, race, and ethnicity since income varies by these demographic characteristics. For hours worked per week, the annual daily averages are adjusted for age and for family income. Young people and older adults tend to work fewer hours than adults in mid-life. And, among Americans who work long hours, those with high income have

potentially more time available for social engagement than those with low income, since they are able to pay for personal services, such as cleaning, yard work, shopping, and cooking. Analyses for family income and hours worked per week were conducted from 2010 to 2020 due to completeness limitations in the data.

From 2003 to 2019, for each social connectedness measure and for each sub-group, we calculated: (1) the *means* and 95% confidence intervals to compare magnitudes across sub-groups, and (2) the *slope* of the linear trend and 95% confidence intervals to compare trends across sub-groups. In calculating the slope, we normalized the time variable to a range from 0 to 1 using the formula [('year' – 2003)/16], (i.e., the year 2003 equals zero, the year 2019 equal one, and all years in between take on values between zero and one in equal increments). Normalizing the time variable this way allows us to interpret the slope coefficient as a change across the entire 17-year period. Means and slopes for family income are adjusted for age, sex, race, and ethnicity. Means and slopes for hours worked per week are adjusted for age and family income. Since the 2020 data do not represent the entire year and since social connection during the pandemic may not be representative of overarching trends, that year was omitted from the calculations of sub-group means and slopes. Whereas in the trendline figures the year 2020 stands on its own, we did not want to insert 2020 into calculations that included other years.

Tables in the online supplement contain the numbers used to construct trendline figures.

3. Results

3.1. Summary statistics of weighted sample

The weighted ATUS sample consisted of 48% male and 52% female participants. Race and ethnicity composition was: 81% white, 13% black, 6% other-race, 15% Hispanic, and 85% non-Hispanic. Each age category was 17% of the sample, except the 55-64-year age group which was 15%. Nineteen percent of participants had an annual family income less than $25,000; 24% made $25,000–$49,999; 32% made $50,000–$99,999; and 25% made ≥$100,000. Thirty-seven percent of participants worked zero hours per week, 12% worked 1–25 h, 43% worked 26–50 h, and 7% worked 50–100 h.

3.2. National social connectedness trends

Fig. 1 presents national trendlines and joinpoint analyses for all six measures of social connectedness. Nationally, the average time spent alone increased from 285-min/day in 2003 to 309-min/day in 2019 and continued to increase to 333-min/day in 2020. The 24-min per day difference between 2003 and 2019 represents 146-h more social isolation in 2019 than in 2003. This 146-h increase in social isolation over the course of 17-years was repeated over the course of one-year between 2019 and 2020. At the national level, joinpoint analyses show that the social isolation slope changed significantly in 2018. In 2003–2018, APC = 0.32 [95%CI=(0.2,0.5); t-statistic = 4.4; p = 0.001] and in 2018–2020, APC = 5.65 [95%CI=(1.2,10.3); t-statistic = 2.7; p = 0.017].

Average time spent socially engaged with household family decreased from 262-min/day in 2003 to 243-min/day in 2019, but increased to 252-min/day in 2020; representing 122-h *less* in 2019 than in 2003; and, 61-h *more* in 2020 than in 2019. Joinpoint analyses for household family social engagement indicate a declining linear trend over the entire observed period with no joinpoints, APC = −0.31 [95% CI=(–0.4,–0.2); t-statistic = −5.2; p < 0.001].

Average time spent socially engaged with non-household family decreased overall from 35-min/day in 2003 to 28-min/day in 2019 and 22-min/day in 2020 representing 43-h less in 2019 than in 2003; and, 37-h less between 2020 and 2019. Joinpoint analyses for non-household family social engagement indicate that the slope changed significantly in 2010 and 2019. The 2003–2010 APC = 0.78 [95%CI=(–1.0,2.5); t-statistic = 1.0; p = 0.348], the 2010–2019 APC = −2.33 [95%CI= (–4.0,–0.6); t-statistic = −2.9; p = 0.014], and the 2019–2020 APC = −20.69 [test statistics unavailable].

Average time spent socially engaged with friends decreased overall from 60-min/day in 2003 to 34-min/day in 2019 and continued to decrease to 20-min/day in 2020 representing 158-h less in 2019 than in 2003; and, 85-h less in 2020 than in 2019. Joinpoint analyses for social engagement with friends indicate that the slope changed significantly in 2007, 2013, and 2019. The 2003–2007 APC = −4.38 [95%CI= (–7.3,–1.4); t-statistic = −3.4; p = 0.010], 2007–2013 APC = 1.58 [95% CI=(–1.0,4.2); t-statistic = 1.4; p = 0.190], 2013–2019 APC = −6.89 [95%CI=(–9.6,–4.1); t-statistic = −5.6; p = 0.001] and 2019–2020 APC = −45.83 [test statistics unavailable].

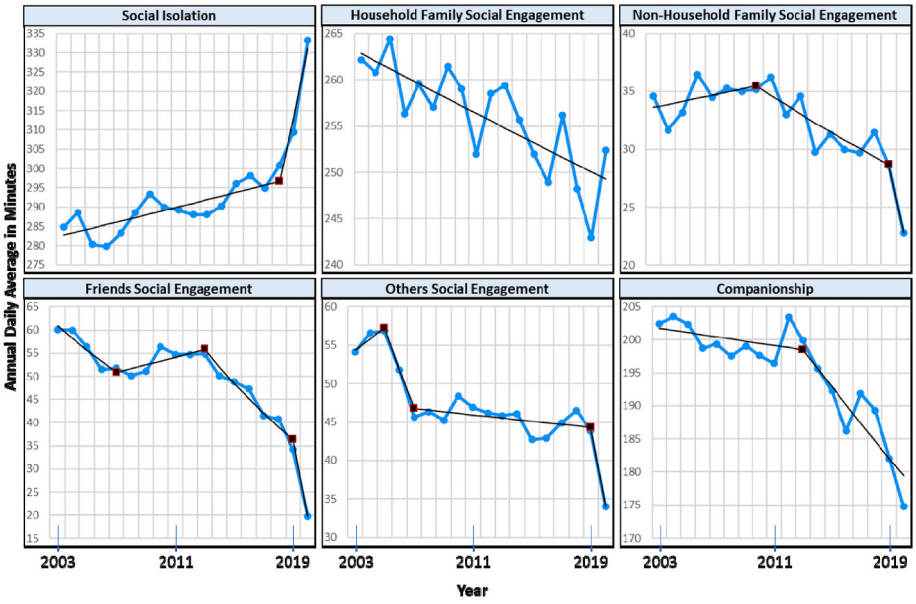

Fig. 1. US Social Connectedness Trends, 2003–2020. Annual Daily Average in Minutes are in blue trendlines. Joinpoint lines are black with red-bordered square points indicating years at which the slope the trendline changes significantly.

Average time spent socially engaged with 'others' decreased overall from 54-min/day in 2003 to 43-min/day in 2019 and continued to decrease to 34-min/day in 2020 representing 67-h less in 2019 than in 2003; and, 55-h less in 2020 than in 2019. Joinpoint analyses for social engagement with 'others' indicate that the slope changed significantly in 2005, 2007, and 2019. The 2003–2005 APC = 2.63 [95%CI=(–5.6,11.6); t-statistic = 0.7; p = 0.501], 2005–2007 APC = −9.63 [test statistics unavailable], 2007–2019 APC = −0.45 [95%CI=(–1.2,0.3); t-statistic = −1.4; p = 0.196] and 2019–2020 APC = −23.23 [test statistics unavailable].

Average companionship time decreased overall from 202-min/day in 2003 to 182-min/day in 2019 and continued to decrease to 174-min/day in 2020 representing 122-h less companionship in 2019 than in 2003; and, 49-h less companionship in 2020 than in 2019. Joinpoint analyses for companionship indicate that the slope changed significantly in 2013. The 2003–2013 APC = −0.16 [95%CI=(–0.5,0.2); t-statistic = −1.1; p = 0.294] and 2013–2020 APC = −1.4 [95%CI=(–2.1,–0.7); t-statistic = −4.3; p = 0.001].

3.3. Sub-group social connectedness trends

Trendlines by sex, race/ethnicity, age, family income, and hours worked per week are depicted in Figs. 2–6, respectively. Table 1 presents means and Table 2 presents slopes, for each social connectedness measure by sub-group, across the years 2003–2019. The sub-group results described here draw from Tables 1 and 2 as well as from the corresponding figures. We describe sub-group social connectedness statistics in hours per year based on the average daily minutes in Tables 1 and 2

3.3.1. Sex (Fig. 2)

From 2003 to 2019, on average, women experienced 37-h/year more social isolation than men. Women spent substantially more time with family (365-h/year more) than men. Men spent slightly more time with friends and 'others' than women. Men also experienced more time in companionship (91-h/year more) than women. Social isolation increased for both men and women. The increase in men's social isolation (176-h over the observed period) was steeper than for women (73-h). All measures of social engagement decreased for both men and women. The decline in social engagement with 'others' and in companionship was steeper for men than for women. Importantly, if current trends continue, men will surpass women in social isolation and fall to or below women in social engagement with friends and 'others' and in companionship.

3.3.2. Race/ethnicity (Fig. 3)

Black Americans experienced more social isolation, on average, than all other racial and ethnic categories: 359-h/year more than white Americans, 444-h/year more than other-race Americans, and 663-h/year more than Hispanic Americans. In total, black Americans also experienced less social engagement across all roles (influenced primarily by household family social engagement), on average, than all other racial and ethnic categories: 377-h/year less than other-race Americans, 395-h/year less than white Americans, and 505-h/year less than Hispanic Americans. Hispanics spent less time socially isolated and more time engaged with household family than non-Hispanics. Time with friends was similar across race, but higher among non-Hispanics than Hispanics. Companionship was highest among white Americans compared to non-white races and Hispanics. Trends over time show larger increases in social isolation and larger declines in companionship for non-white races and Hispanics compared to white Americans.

3.3.3. Age (Fig. 4)

Social isolation was highest for the oldest age category (≥65-years) which experienced, on average, 554-h/year more social isolation than those ages 55-64-years, 925-h/year more than those ages 45-54-years, and 1405-h/year more than those ages 25-34-years. Of all age groups, the youngest age category (15-24-years) spent the least amount of time with household family and the most amount of time with friends and others. On average, the youngest age group also spent the most amount of time in companionship — followed by the oldest age group. However, as shown in Fig. 4, from 2015 to 2020, the oldest age group eclipsed the youngest age group in companionship. So, although adults 65-years and older experienced the most social isolation, they also had relatively high levels of companionship. From 2003 to 2019, social engagement plummeted with friends (377-h), 'others' (195-h), and in companionship (298-h) for the youngest age group.

3.3.4. Annual family income (Fig. 5)

Annual family income analyses are adjusted for age, sex, race, and ethnicity and start in 2010 due to data completeness limitations. Social isolation was inversely related to family income. From 2010 to 2019, on average, the lowest income group (<$25K) experienced 310-h/year

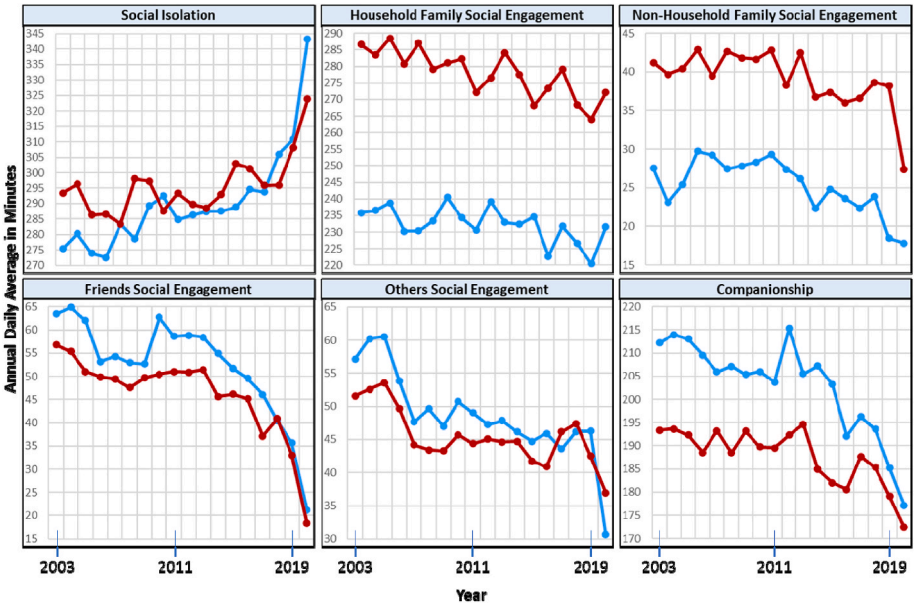

Fig. 2. By sex: US social connectedness trends, annual daily average in Minutes, 2003–2020. Men (blue), Women (red).

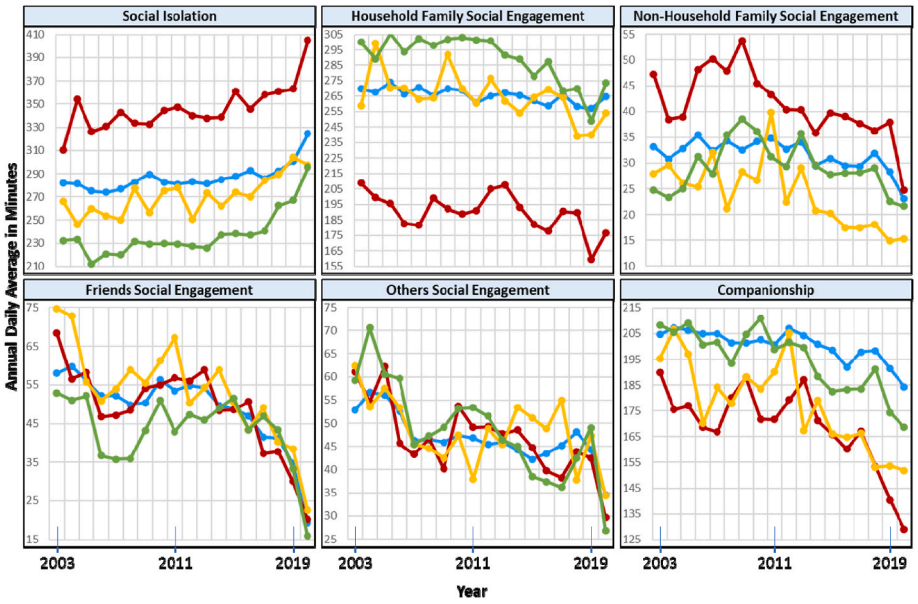

Fig. 3. By race & ethnicity: US social connectedness trends, annual daily average in Minutes, 2003–2020. White (blue), Black (red), Other (yellow), Hispanic (green).

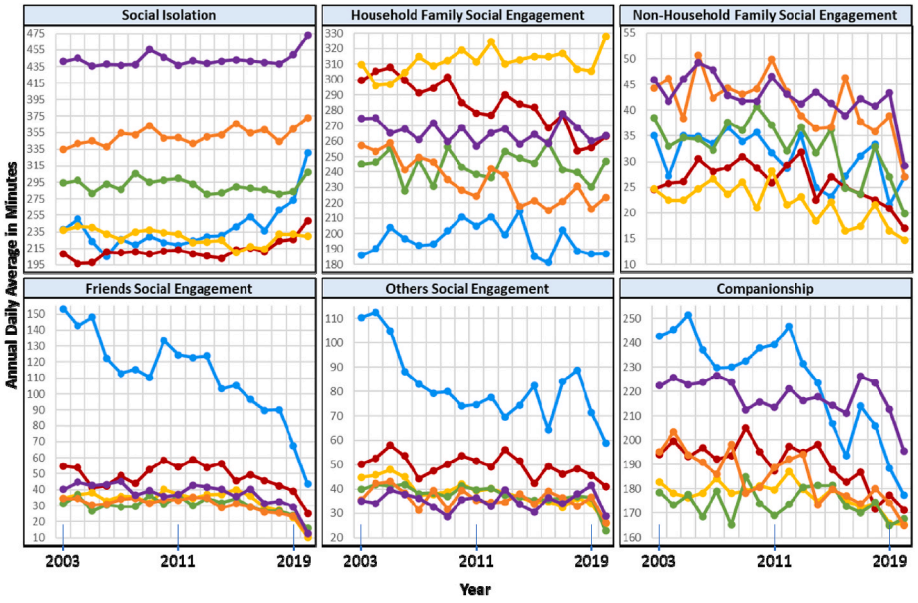

Fig. 4. By age: US social connectedness trends, annual daily average in Minutes, 2003–2020. 15-24 years (blue), 25-34 years (red), 35-44 years (yellow), 45-54 years (green), 55-64 years (orange), 65+ years (purple).

more social isolation than the $25K–$50K income group, 462-h/year more social isolation than the $50K–$100K income group, and 596-h/year more social isolation than the ≥$100K income group. Time spent with household family was proportional to family income, whereas time spent with non-household family was inversely related to family income. The lowest income group also experienced the largest decline in social engagement with household family and in companionship (420-h and 377-h decline over the observed period, respectively). And, the lowest income group spent slightly more time with 'others' than the higher income groups.

3.3.5. Hours worked per week (Fig. 6)

Analyses for hours worked per week are adjusted for age and family income and start in 2010. Social isolation, social engagement overall, and time in companionship are all inversely related to the number of hours worked per week. Less hours spent at work potentially affords Americans more time to spend alone as well as more time to spend with other people. Those who work 25 h or less experienced greater declines in friend social engagement than those who work more than 25 h; perhaps, because this group had more "wiggle room" — that is, by already spending more time with friends in 2003, they could potentially lose more time in that social relationship. Otherwise, while the four categories of work hours differed somewhat in their slopes, the overall pattern was one of similarity in trends over time.

4. Discussion

This study was motivated by the need for a population wide account of trends in various social connectedness measures and across various sub-groups with the purpose of situating our current understanding

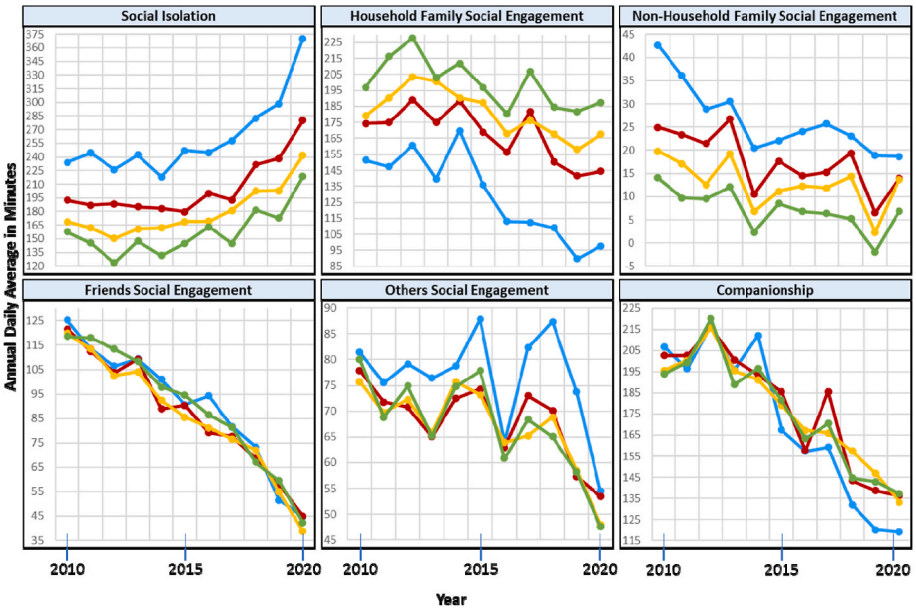

Fig. 5. By Annual Family Income (adjusted for age, sex, race, and ethnicity): US Social Connectedness Trends, Annual Daily Average in Minutes, 2010–2020. $<25K (blue), $25K-<50K (red), $50K-<100K (yellow), $≥100K (green).

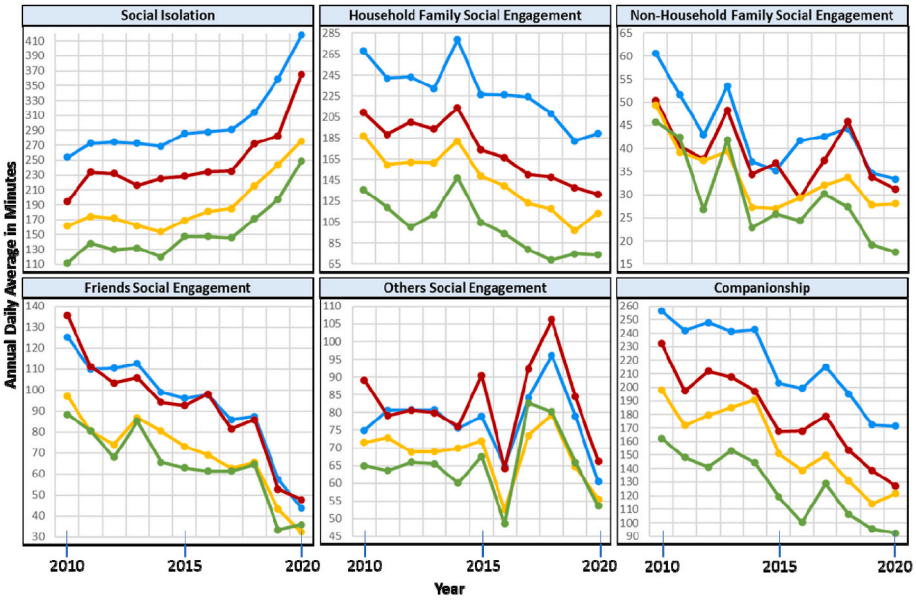

Fig. 6. By Typical Work Hours per Week (adjusted for age and annual family income): US Social Connectedness Trends, Annual Daily Average in Minutes, 2010–2020. Zero hours (blue), 1–25 h (red), 26–50 h (yellow), 50–100 h. (green).

within this broad perspective and for stimulating structural, policy-based proposals to improve social connectedness. We find Americans' social connectedness declined over almost two decades — social isolation increased, social engagement decreased across all roles, and companionship decreased.

The prevailing trend for most social connectedness measures was exacerbated by the pandemic. However, household family social engagement and companionship showed signs of progressive decline years prior to the pandemic, at a pace *not* eclipsed by the pandemic. Social connectedness may be affected by the pandemic for years to come. However, since social connectedness trends were declining even before the pandemic started, simply 'getting back to normal' is insufficient. A limitation of note is that, for 52 days *during the height of social distancing* (March 18, 2020–May 9, 2020), no data was collected. Thus, the uptick in social isolation and social engagement with household family and the decline in all other forms of social engagement are likely underestimated for 2020. Our ability to accurately assess the impact of the pandemic on social connectedness will require re-examining these trends over the next several years.

The most dramatic trends in social connectedness were seen in the plummeting social engagement with friends, 'others', and companionship for the youngest group (15-24-years) relative to all other ages. Previous studies suggest that adolescents and young adults may be substituting online, digital social interaction for in-person, face-to-face social engagement (Twenge et al., 2019; Twenge & Spitzberg, 2020). Recent cohorts of adolescents and young adults will age with having experienced less peer social engagement and companionship in their youth than previous cohorts. The decline in social engagement with

Table 1
Average number of daily minutes of social connectedness from 2003 to 2019[a] — means [95% confidence intervals].

Group Characteristic	Social Isolation	Household Family	Non–Household Family	Friends	All Others	Companionship
Sex						
Male	288 [286, 290]	232 [230, 235]	26 [25, 27]	54 [53, 55]	49 [49, 50]	204 [202, 206]
Female	294 [292, 296]	278 [276, 280]	40 [39, 41]	48 [46, 49]	46 [45, 47]	189 [187, 190]
Race						
White	285 [282, 287]	265 [262, 268]	32 [31, 33]	50 [49, 52]	47 [46, 49]	201 [199, 203]
Black	344 [340, 347]	190 [187, 194]	42 [41, 44]	50 [48, 52]	47 [46, 49]	171 [168, 173]
Other	271 [266, 275]	264 [259, 269]	24 [22, 26]	54 [51, 56]	49 [47, 51]	177 [174, 181]
Ethnicity						
Non-Hispanic	301 [298, 304]	250 [247, 254]	33 [32, 35]	52 [50, 53]	47 [46, 49]	196 [194, 199]
Hispanic	235 [232, 238]	288 [285, 292]	30 [28, 31]	45 [43, 46]	49 [47, 50]	195 [193, 197]
Age						
15–24 years	234 [232, 237]	197 [194, 200]	31 [30, 32]	115 [114, 117]	83 [82, 85]	227 [225, 229]
25–34 years	211 [208, 213]	285 [282, 288]	27 [25, 28]	49 [48, 51]	50 [48, 51]	191 [189, 193]
35–44 years	229 [226, 232]	310 [307, 313]	22 [21, 23]	34 [33, 36]	40 [38, 41]	178 [176, 180]
45–54 years	290 [287, 293]	244 [241, 247]	34 [32, 35]	31 [29, 32]	38 [37, 40]	175 [173, 177]
55–64 years	351 [348, 354]	233 [230, 237]	42 [41, 43]	31 [29, 33]	37 [35, 38]	185 [183, 187]
≥65 years	442 [439, 444]	266 [263, 269]	43 [42, 44]	38 [37, 40]	35 [34, 37]	219 [217, 221]
Family Income[b]						
$ <25K	245 [242, 248]	130 [127, 134]	29 [28, 31]	100 [99, 102]	82 [81, 84]	183 [181, 186]
$ 25K - <50K	194 [191, 197]	166 [163, 170]	20 [19, 22]	96 [95, 98]	73 [72, 75]	188 [186, 191]
$ 50K - <100K	169 [167, 172]	179 [176, 182]	15 [14, 16]	94 [93, 96]	72 [71, 74]	187 [185, 189]
$ ≥100K	147 [145, 150]	198 [194, 201]	9 [8, 10]	97 [95, 99]	73 [71, 74]	185 [183, 188]
Hours of Work per Week[c]						
zero hours	287 [284, 290]	234 [231, 238]	44 [43, 46]	99 [98, 101]	80 [78, 81]	222 [220, 225]
1–25 h	234 [230, 238]	179 [174, 184]	40 [38, 42]	97 [94, 99]	84 [82, 86]	186 [182, 189]
26–50 h	180 [177, 183]	149 [145, 152]	34 [33, 36]	74 [73, 76]	69 [68, 71]	162 [159, 164]
>50 h	143 [137, 148]	105 [98, 111]	31 [28, 33]	69 [65, 72]	67 [64, 69]	131 [126, 135]

Note.
[a] Except family income and hours worked per week which cover the years 2010–2019.
[b] Analyses for family income are adjusted for age, sex, race, and ethnicity.
[c] Analyses for hours worked per week are adjusted for age and family income.

Table 2
Trends in daily minutes of social connectedness from 2003 to 2019[a] — slopes [95% confidence intervals].

Group Characteristic	Social Isolation	Household Family	Non– Household Family	Friends	All Others	Companionship
Sex						
Male	29 [24, 34]	−11 [−16, −5]	−6 [−8, −4]	−20 [−23, −17]	−14 [−17, −12]	−22 [−26, −18]
Female	12 [7, 16]	−18 [−23, −13]	−5 [−7, −2]	−16 [−19, −14]	−8 [−10, −6]	−12 [−15, −8]
Race						
White	17 [13, 20]	−12 [−16, −7]	−4 [−6, −2]	−17 [−19, −15]	−11 [−12, −9]	−12 [−15, −9]
Black	33 [23, 43]	−20 [−29, −10]	−10 [−15, −6]	−21 [−26, −16]	−14 [−18, −10]	−28 [−35, −20]
Other	36 [22, 51]	−28 [−45, −12]	−14 [−20, −8]	−25 [−33, −16]	−9 [−16, −1]	−41 [−52, −30]
Ethnicity						
Non-Hispanic	21 [17, 25]	−12 [−16, −8]	−6 [−8, −4]	−20 [−22, −18]	−9 [−11, −7]	−14 [−17, −11]
Hispanic	35 [26, 43]	−40 [−51, −30]	−2 [−6, 2]	−4 [−9, 1]	−22 [−27, −18]	−29 [−36, −22]
Age						
15–24 years	31 [22, 40]	−3 [−13, 8]	−8 [−13, −4]	−62 [−71, −54]	−32 [−39, −25]	−49 [−58, −41]
25–34 years	17 [10, 23]	−45 [−55, −35]	−5 [−8, −1]	−5 [−10, 0]	−5 [−9, −1]	−18 [−25, −12]
35–44 years	−18 [−25, −12]	9 [1, 18]	−7 [−10, −4]	−7 [−10, −4]	−13 [−16, −10]	−9 [−14, −3]
45–54 years	−11 [−19, −3]	−2 [−11, 6]	−8 [−12, −5]	−4 [−8, −1]	−6 [−9, −3]	−3 [−9, 3]
55–64 years	15 [5, 24]	−39 [−49, −30]	−8 [−13, −4]	−9 [−12, −5]	−3 [−7, 0]	−22 [−29, −16]
≥65 years	3 [−7, 12]	−5 [−14, 4]	−5 [−9, −1]	−11 [−14, −8]	2 [−1, 5]	−7 [−13, 0]
Family Income[b]						
$ <25K	43 [24, 62]	−69 [−88, −49]	−21 [−30, −12]	−32 [−41, −23]	12 [3, 20]	−62 [−77, −48]
$ 25K - <50K	34 [17, 51]	−22 [−41, −3]	−13 [−20, −5]	−32 [−41, −24]	−6 [−13, 2]	−30 [−44, −17]
$ 50K - <100K	40 [26, 54]	−21 [−37, −5]	−5 [−12, 1]	−37 [−45, −29]	−6 [−12, 1]	−12 [−24, −1]
$ ≥100K	21 [6, 36]	−13 [−32, 6]	−6 [−12, 1]	−45 [−55, −35]	−9 [−16, −1]	−22 [−36, −9]
Hours of Work per Week[c]						
zero hours	39 [24, 54]	−29 [−45, −13]	−15 [−22, −8]	−39 [−47, −32]	3 [−3, 10]	−36 [−48, −25]
1–25 h	34 [12, 56]	−36 [−61, −10]	3 [−8, 13]	−59 [−74, −45]	11 [−2, 24]	−40 [−58, −21]
26–50 h	36 [26, 46]	−40 [−53, −27]	−9 [−14, −4]	−28 [−35, −22]	−13 [−18, −8]	−31 [−40, −22]
>50 h	24 [2, 46]	−9 [−38, 21]	−17 [−28, −5]	−27 [−41, −13]	4 [−7, 15]	−5 [−26, 16]

Notes.
[a] Except family income and hours worked per week which cover the years 2010–2019.
[b] Analyses for family income are adjusted for age, sex, race, and ethnicity.
[c] Analyses for hours worked per week are adjusted for age and family income.

friends and 'others' was not replaced by more social engagement with family. Youth is when people tend to be more socially engaged with friends, 'others', and in companionship than at any other time in life as evident in our data. If, as research indicates, adolescence and young adulthood are sensitive life-stages for socializing with non-family (Blakemore & Mills, 2014), then the current youth cohort is experiencing substantial loss in socialization experiences. Since social experiences in older adulthood are a function of relational histories over the life-course

(Antonucci, Fiori, Birditt, & Jackey, 2010), reductions in friend and 'other' social engagement and in companionship for young people may have health and longevity implications for this cohort in future years as they age.

Having more leisure (non-work) time seems to allow for people to allocate more time toward both social engagement and social isolation. This is evident for people who work zero hours per week and for older adults ≥65-years who are likely retired and, thus, working zero or reduced hours. People who work zero hours per week had both the highest magnitude of social isolation and the highest or second highest magnitudes for all social engagement types and for companionship. Similarly, those ≥65-years (and likely retired) had high levels of both social isolation and companionship. Having larger amounts of leisure time implies that the amount of social engagement and the amount of social isolation can be generated more from personal decision making rather than from externally imposed time constraints. Among those with greater leisure time, this pattern of increased time allocation for both engagement and isolation suggests that some amount of social isolation is welcome and beneficial to the individual. Time for oneself affords the individual the opportunity to engage in self-care and personal interest activities. Indeed, some amount of time spent with oneself, absent of other people, is in alignment with self-care (Denyes, Orem, & Bekel, 2001; Levin & Idler, 1983). Thus, large amounts of social isolation should not necessarily be viewed as detrimental in the absence of information about available leisure time and amount of social engagement. However, it is important to note that older adults have additional constraints beyond work imposed by declining health and disability.

Labor conditions should be studied as a structural constraint to social connectedness. In fact, workers cite difficulties with meaningful relationships in recent labor strikes that have centered around long work hours and mandatory overtime (Eidelson, October 25, 2021). And, the surgeon general states that excessive work hours contributes to isolation, but could be remedied by employers willing to protect workers' time outside of work (McGregor, 2017). We recommend policy initiatives that disincentivize employers from extracting long work-hours or paying wages low enough to require second and third jobs (thus, increasing total work-hours).

Women spent more time with family but less time with friends and in companionship than men. Different relationship types could potentially impact health and longevity differently for different groups. For example, among young adults, support from friends has the strongest positive impact on mental health, strain from family has the strongest negative impact, and friend support has a protective effect buffering family strain (McLaughlin, Horwitz, & Raskin White, 2002; Obradović, Tirado-Strayer, & Leu, 2013). For older adults, the quality of friend relationships contributed more to life satisfaction than the quality of relationships with their children (O'Connor, 1995). And, for older adults, while family activities increase positive affect, it also increased negative affect; whereas friend activities increased positive affect and decreased negative affect and, further, also increased life satisfaction (Huxhold, Miche, & Schüz, 2014). Additionally, the importance of friendships have been increasing for recent generations of older adults (Fiori, Windsor, & Huxhold, 2020). Role and normative expectations influence individuals' social relationships (Antonucci et al., 2010). Women's social engagement patterns may reflect the social and biological expectations women face regarding family life. Men's social engagement patterns could reflect cultural norms around masculinity.

Nuances arise regarding differential allocation of social exposure and consequent health outcomes. For example, Hispanics spend markedly greater time with household family than non-Hispanics. This pattern may be a consequence of Hispanic attitudinal and behavioral familism (Cahill, Updegraff, Causadias, & Korous, 2021; Ruiz, 2005; Sabogal, Marín, Otero-Sabogal, Marín, & Perez-Stable, 1987). Perhaps, family relationships are more salubrious for women, whereas men may benefit more from time spent with friends. Or, possibly, women suffer from the added stress of familial duties and obligations on top of less time spent in voluntary associations, e.g., with friends and in companionship. Further studies examining social connectedness tendencies and preferences related to relationship types could illuminate the importance of relationship roles and cultural norms in explanations linking social exposure to health and longevity.

Social connectedness research has focused heavily on older adults, often characterizing late-life as socially isolated. Indeed, 20% of older adults (approximately 6.4 million people) report being socially isolated, while 1.3 million older adults are characterized as *severely* socially isolated (Cudjoe et al., 2020). This study shows that both high social isolation and high companionship levels characterize older adulthood. This pattern potentially indicates an equilibrium between self-time (for self-care or pursuit of one's own preferred activities) and social-time during retirement. And, at the same time that older adults experience the loss of social network members, they also experience network growth by cultivating new social ties, adding new confidant relationships, increased socializing with neighbors, and increased community involvement (Cornwell, Goldman, & Laumann, 2021; Cornwell & Laumann, 2015; Cornwell, Laumann, & Schumm, 2008). These changes in the social networks of older adults may facilitate greater companionship. Despite social network losses, when older adults cultivate new confidants, their mental and physical health improve (Cornwell & Laumann, 2015). Socioemotional selectivity theory proposes that older adults intentionally prune their social networks to create space for more emotionally meaningful relationships (Carstensen, 2021) which could increase their time spent in companionship.

Black Americans experienced both high social isolation and low social engagement. One structural explanation worth future investigation is architectural exclusion. Black Americans sometimes live in 'walled-off' neighborhoods; are often excluded from access to features of the built environment that promote socialization such as parks, public pools, and sidewalks; and, design elements such as bridges and one-way streets are used to limit movement to and from black communities (Einhorn & Lewis, July 19, 2021; Kaźmierczak, 2013; Leyden, 2003; Schindler, 2015; Travieso, 2020). Black Americans tend to experience greater threat from the police (Alang, 2018; Alang, McAlpine, McCreedy, & Hardeman, 2017). Simultaneously, black Americans also express greater fear for their safety in their own neighborhoods — a fear that is, paradoxically, *deepened* by greater neighborhood social capital (Roman & Chalfin, 2008). Thus, obstacles to social connection exist inside and outside of black communities. Further, non-Hispanic blacks work non-standard shifts (i.e., evenings, nights, and rotating or highly variable work shifts) to a greater extent than their Hispanic or white counterparts (Presser, 2003). As mentioned previously, labor conditions might be an important constraint on social engagement. Thus, potentially, a wide range of economic and social policies may be necessary to improve social connectedness for this group.

The lowest income group had more social engagement with 'others' than higher income groups and was the only group to show a statistically significant, positive linear trend in social engagement with 'others'. This 'others' category includes acquaintances, co-workers, neighbors, and roommates, and could be an indicator of the degree to which individuals are either pressed to tap into or have the leisure to engage socially with a wide array of social connections. Most studies in social connectedness investigate isolation or engagement with friends and family. Future research on social engagement with 'others' could reveal information about who taps into this social resource, why, and under which social and economic conditions.

The steady decline of household family social engagement overtime could be due to changes in marriage formation. On average, since the baby boomers, Americans have married at increasingly later ages, if they marry at all (Bloome & Ang, 2020). Declining marriage trends have been especially steep for low-income individuals and for black Americans across all economic backgrounds (Bloome & Ang, 2020). Our findings show that, on average, low-income Americans have lower and rapidly declining household family social engagement than other income

groups, and that black Americans have lower household family social engagement than other race groups. Thus, the changing landscape of marriage nationally and across sub-groups could contribute to differences in magnitudes and trends for household family social engagement.

5. Conclusion

Examining temporal trends in social connectedness nationally, we see overall increases in time spent alone and overall decreases in time spent with family, friends, others (roommates, neighbors, acquaintances, coworkers, clients, etc.), and in companionship. Thus, the answer to the question, "is social connectedness improving over time?" is a resounding, "no". Overall, 2020 exacerbated these patterns. Subgroup analysis showed that Black Americans experienced the greatest overall disparity in social connectedness. Of importance to structural solutions, less hours of work obligation allowed people to apportion their time both for themselves and for social engagement. In fact, labor conditions may be an important obstacle to both social engagement and socially isolated time needed to care for oneself. Social isolation should be studied with respect to total available leisure time, indicating the total amount of personal time available for making time allocation decisions. Social isolation should also be studied in relation to amount of social engagement, alone time spent in self-care, and time spent in personal interest activities, rather than as monolithically detrimental. Future research could assess how relationship types contribute to health and longevity and if sub-groups respond differently to different relationship types. Finally, digital media may be changing the socialization dynamics of young people with the implications for social connection in mid- and late-life to be observed in future decades.

Author statement

Viji Diane Kannan: Conceptualization, Methodology, Formal analysis, Writing - Original Draft, Writing - Review & Editing.

Peter Veazie: Methodology, Writing - Review & Editing, Supervision.

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There was no need for IRB approval as publicly available, secondary data was used.

Declaration of competing interest

We have no conflicts of interest.

Data availability

Data will be made available on request.

Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.ssmph.2022.101331.

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