A Twenty-First Century of Solitude? Time Alone and Together in the United States

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Abstract

This paper explores trends in time alone and with others in the United States. Since 2003, Americans have increasingly spent their free time alone, on leisure at home, and have decreasingly spent their free time with individuals from other households. These trends are more pronounced for non-White individuals, for males, for the less educated, and for individuals from lower-income households. Survey respondents who spend a large fraction of their free time alone report lower subjective well-being. As a result, differential trends in time alone suggest that between-group subjective well-being inequality may be increasing more quickly than previous research has reported.

JEL Codes: D12, I31, J11

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1 Introduction

In this paper, I examine individuals' time spent alone and with others. The predominant mode of analyzing time allocation involves modeling and measuring what activities individuals spend their time on (Becker, 1965; Ghez and Becker, 1975; Aguiar and Hurst, 2007). But humans are social animals: Our well-being depends not only on the goods and services we purchase in the market and the time we allocate to different activities, but also on the emotional support, material and behavioral assistance, and information we receive from others in our social networks (Umberson and Karas Montez, 2010; Thoits, 2011; Jackson et al., 2017). To the extent that individuals differ in the emotional, instrumental, and informational support received from others, conventional income, consumption expenditure, and even time allocation measures may miss a key component of well-being.

I study with whom individuals spend their time using the American Time Use Survey (ATUS). For each year between 2003 and 2022, survey respondents were asked to provide detailed information about the previous day's activities, including how, where, and with whom they spent their time. For each individual, I compute the share of individuals' time that is spent alone or with others; for activities performed with others, I separately measure whom individuals spend their time with. Furthermore, I measure time spent alone and with others, both in the aggregate and by type of activity. Finally, using a well-being supplement to the 2010, 2012, and 2013 ATUS, I evaluate the potential importance of these trends in time spent alone.

Americans increasingly spend their time alone.[1] Between 2003 and 2019, the share of time spent alone increased from 43.5 percent to 48.7 percent. It then further increased in the first year of the pandemic to 50.7 percent in 2020 before falling slightly to 49.7 percent by the end of the sample period, in 2022. These trends exist with and without controls for observable demographic characteristics. Increases in time spent alone mirror, in the aggregate, time spent with individuals from outside of the respondent's household, which has declined from 21.9 percent in 2003 to 17.3 percent in 2019. By 2022, it had decreased to 14.3 percent.

Trends in time alone vary substantially across demographic, educational, and income categories. At the beginning of the sample period, individuals with a high school education or less spent a slightly smaller fraction of their time alone (42.9 percent vs. 43.9 percent) relative to college-educated individuals. By 2019, alone time in the high-school-or-less group

[1]The ATUS asked respondents consistently throughout the 2003 to 2022 period with whom activities took place (excluding time spent at work, time sleeping, and time on personal grooming activities). As a result, the measures I develop will focus on non-work, non-sleep, and non-personal time. Adapting terminology from Frazis (2022), I use "eligible time" to refer to this set of activities. One contrast is that Frazis (2022) includes work time in his definition of eligible time. I explain this difference in footnote 6.

was 4.7 percentage points (p.p. hereafter) *higher* than in the college-or-more group. A similar differential trend exists between individuals in high-income households (a 3.4 p.p. increase in alone time) relative to those in low-income households (a 7.0 p.p. increase), and between non-Hispanic White individuals (a 3.5 p.p. increase) versus non-White individuals (a 8.6 p.p. increase). Moreover, these differential trends exist with or without controls for observable characteristics — such as age, urban status, and employment status — that are correlated with individuals' time spent alone.

I explore precisely what activities account for these differential trends. While all demographic groups increasingly spend their available time enjoying leisure at home — watching television and, to a lesser extent, playing video-games — with whom this leisure is enjoyed varies across demographic groups: Less educated, non-White individuals increasingly spend their at-home leisure time alone. A significantly smaller fraction of their leisure time occurs outside of the house and with others.

Reported life satisfaction is negatively correlated with time spent alone. Furthermore, reported happiness during a (non-work) activity is consistently lower when it is performed alone. This latter relationship holds both within individual — comparing subjective well-being among two activities performed by the same person, one alone and the other not — and within the same activity — comparing two activities of the same type, one performed by an individual who was alone and the other by someone who was not. Since time spent alone has increased most sharply for less educated, non-White, lower-income individuals, these trends in time alone may represent a salient source of increasing subjective well-being inequality. In a final step of the analysis, I provide a back-of-the-envelope calculation to gauge the importance of differential trends in time alone. I find the extra increase in alone time for individuals with a high school education or less compared to those with a college education or more corresponds to a decline in subjective well-being equivalent to a 10 to 20 percent reduction in household income (depending on the measure of subjective well-being used). These estimates should be treated with caution: As I discuss in Section 5, comparisons across groups based on subjective well-being measures are tenuous; the relationships among well-being measures, income, and time alone are correlational. Nevertheless, these results indicate that with whom individuals spend their time is an important, previously unmeasured channel of increasing inequality across households.

Section 2 places these results in context of the literature. It also collects the research questions considered in this paper. Section 3 describes the dataset and measures of how and with whom individuals spend their time. Section 4 presents trends in time alone, while Section 5 considers the implications of these trends for inequality in subjective well-being.

Section 6 concludes.[2]

2 Background

In this section, I review the extant literature on aloneness. Subsequently, I summarize the unresolved questions within this literature that I address in the remainder of the paper.

2.1 Related Literature

This paper contributes to strands of literature exploring (i) long-run trends in time use and their implications for inequality across households and (ii) the correlates of increasing social isolation.

Within the first body of literature, Aguiar and Hurst (2007) study trends in leisure between 1965 and 2003. Over that period, both the average and dispersion of leisure time increased. Leisure increased most for lowest-income households, implying that income-based measures of inequality may overstate the increase in welfare inequality.[3] Second, Aguiar et al. (2021) apply time use data to argue that recent declines in young males' employment are due, in part, to a decline in labor supply that can be traced back to improvements in the quality of television and video games. This contrasts with research focusing on reductions in labor demand, an interpretation consistent with reductions in young males' socioeconomic status over the last few decades (e.g., Autor et al., 2019). Third, Boerma and Karabarbounis (2021) employ data on households' time spent in home and in market production, in conjunction with a model of time use, to infer productivity at home and in the market. They identify substantial home-production efficiency differences across households, implying that welfare inequality may be greater than previously thought. Similar to these papers, this paper re-examines trends in subjective well-being inequality with time use data. In contrast, it adds information about not only what activities individuals pursue but also with whom they spend their time.

Closer to the focus of this paper, Sevilla et al. (2012) re-examine 1965 to 2003 trends in subjective well-being inequality by measuring the "quality" of leisure time. They conceptualize quality leisure time as time that takes place with one's spouse, with adults more generally, in uninterrupted spells, and not concurrently with other non-leisure activities. Consistent with Aguiar and Hurst (2007), Sevilla et al. (2012) find that hours spent in leisure activities increased, especially for individuals with low levels of education. However, the quality

[2] In the appendices, I provide additional detail on variable definitions (Appendix A) and supplementary analyses to Sections 4 and 5 (Appendices B and C, respectively). In Appendix D, I discuss changes in time alone and with others for an earlier period, beginning in 1965.

[3] Aguiar and Hurst (2016) find that these trends continue up to 2013.

of leisure time decreased, with the largest declines occurring for those without any college education. Relevant to the current study, they report that the fraction of leisure time that is spent with adults fell, with larger declines for individuals without a college degree. Applying the same dataset and methodology, I re-examine these arguments in Appendix D. I find that the share of time alone increased by 4 p.p. between 1965 and 2003, with no differential increase among low-education vs. high-education individuals. I discuss the sources behind these contrasting conclusions in Appendix D.

A second strand of literature assesses trends in social isolation and considers its implications for individuals' mortality and well-being (Holt-Lunstad et al., 2015; Case and Deaton, 2017, 2022; and Appau et al., 2019) and the development of social capital (Putnam, 1995, 2000). Within this second literature, and closer to the focus of the current paper, are analyses of surveys on time spent alone: Twenge et al. (2019); Twenge and Spitzberg (2020); Drotning (2020); Hamermesh (2020); Burlina and Rodríguez-Pose (2021); and Anttila et al. (2020). Twenge and Spitzberg (2020); Drotning (2020); and Hamermesh (2020), as in the current paper, also measure time spent alone using the ATUS. Twenge and Spitzberg (2020) show that alone time has increased between 2003 and 2017, with the largest increases for younger individuals. Drotning (2020) documents that across racial and ethnic groups, Black men spend the most time alone, while Hispanic women spend the least time alone. Writing at the beginning of the COVID-19 pandemic, Hamermesh (2020) argues that, since married individuals' subjective well-being increases in time with their spouses while single individuals' well-being decreases with time alone, COVID-19-related lock-downs are likely to reduce the well-being of single relative to married individuals. Twenge et al. (2019) and Anttila et al. (2020), respectively, document decreasing socialization among U.S. high schoolers and Finnish adults.

In addition to various time use surveys, social scientists have employed the General Social Survey (GSS) to measure social isolation, drawing mixed conclusions on trends. McPherson et al. (2006) study trends in the number of distinct individuals that respondents report having important discussions with, finding that this number declined by nearly one-third between 1985 and 2004. However, Fischer (2009) suggests measurement of discussion networks in the 2004 GSS may be fragile. In addition to the questions on discussion networks, the GSS asks respondents how often they spend the evening socializing with neighbors, with friends living outside of their neighborhood, or with relatives: never, once a year, several times a year, monthly, several times a month, weekly, or daily. Clark (2015) finds no trends in these measures. Compared to the GSS, the ATUS has at least two advantages. It permits an analysis of trends in socialization within the household — including with one's children and partner — and across households in a consistent manner. And, at least compared to the question regarding socialization in the evenings, it includes a measure of socialization that

exists on a continuous scale.

2.2 Synopsis of Hypotheses

While there are papers that suggest otherwise, existing research predominantly concludes that (i) social isolation and aloneness have increased over at least the last half century, and (ii) while greater solitude may be beneficial in certain contexts, on the whole, these increases indicate a meaningful deterioration in subjective well-being. With this as context, in this section I spell out the hypotheses that I explore in the remainder of the paper.

The first part of the empirical analysis (in Sections 3 and 4) evaluates the magnitude and sources of increased time alone. I explore why time alone per adult has increased, and for which demographic groups aloneness has increased the most.

One natural hypothesis posits that population-wide averages in time alone have increased due to changing demographic characteristics within the U.S. As Klinenberg (2013), Doepke and Tertilt (2016), and others have documented, households have become smaller over time. Further, elderly individuals constitute an increasing share of the population. Since older individuals and those from smaller households spend a greater share of their time alone, at least some portion of the overall decline in time with others can be explained by shifts in demographic composition.

A second prominent hypothesis states that the proliferation of digital communication technologies has moved the locus of social interactions away from in-person towards virtual environments (e.g., Twenge et al., 2019). In assessing this hypothesis, I will quantify increases in time spent on activities that plausibly involve online social interactions, both in the aggregate and among the specific demographic groups for which in-person social interactions have declined the most.

In Section 4, I corroborate each of these two hypotheses. Yet, there is still a substantial increase in time alone, even holding fixed individuals' demographic characteristics and even after accounting for any increase in digital socialization. To better understand the increase in time alone, I examine the types of interactions that may have been displaced over the last two decades and identify the groups of individuals with the greatest increase in time alone.

Measuring heterogeneity across demographic groups not only informs trends in subjective well-being inequality (a subject I will turn to momentarily), but also offers clues as to why alone time is increasing in general. Recent research has hypothesized that socioeconomic status, education, success in the labor market, and social participation may be increasingly inter-related.[4] Any differential decrease in social participation according to socioeconomic

[4]Deming (2017) documents that social skills — which both facilitate future interpersonal relationships and are developed in relationships from the past — increasingly shape one's career success. Kunze and

status would be consistent with the characterization of Case and Deaton (2020, p 167) that "[t]he gulf between the less and the more educated has widened, not only in the labor market but also in marriage, in child rearing, in religion, in social activities, and in participation in the community." Diverging trends in social participation according to socioeconomic status are in accordance with the idea that a cluster of traits — potentially related to sociability — form this dividing line. Understanding which types of interactions — whether with spouses, children, relatives, friends, or others — have declined over the last two decades will clarify the salient links between socioeconomic status and social isolation.

As time together is necessary to build and develop deep interpersonal relationships (e.g., Roberts and Dunbar, 2011; and Hall, 2019), the trends that I present in Sections 3 and 4 portend a deterioration in social ties, especially across households and especially for less educated and non-White individuals. While establishing causality remains a challenge in certain contexts, sociologists, economists, and psychologists have each argued that these social ties are a key contributor to success in the labor market, to economic mobility, to health, and to overall well-being (Granovetter, 1973; Chetty et al., 2022; Diener and Seligmann, 2002; and Holt-Lunstad et al., 2015). On the other hand, other researchers have highlighted the benefits associated with solitude: For example, Long and Averilli (2003) argue that aloneness confers freedom (to engage in the activities one finds most interesting and from self-consciousness), facilitates creativity, and enhances spirituality. The second component of the empirical analysis in this paper (Section 5) investigates the implications of increasing solitude for overall well-being and for subjective well-being inequality. Given the possibility that the relationship between time alone and subjective well-being may differ according to the precise measure involved, this section examines both individual measures of emotional well-being, life satisfaction, as well as various combinations thereof.

3 Dataset and Variable Definitions

This paper employs data from the American Time Use Survey (ATUS) (Hofferth et al., 2020), a product of the Bureau of Labor Statistics (BLS). Since 2003, this dataset draws on a sample of participants of the Current Population Survey (CPS), the main labor force survey conducted in the United States. The ATUS is completed during the final month participants are in the CPS sample. ATUS participants are asked in detail to recall how they spent the previous day: minute by minute, where they were, who they were with, and what they were doing. In addition, since it can be linked to the CPS, the data contain rich demographic information on survey respondents, including information on the participants' educational

Suppa (2017) argue that unemployment, whose risk is largely borne by less-educated workers, causally leads to social isolation.

background, their household composition, and their labor market status. The only restriction I make is to drop individuals who are younger than 18 years old, approximately 5.5 percent of the original sample.[5] Throughout the analysis, I apply the ATUS sampling weights.

When measuring with whom individuals spend their time, I consider two alternate categorizations. In a first categorization, I consider whether an activity is conducted (i) alone, (ii) with other individuals from the respondent's household, or (iii) with other individuals outside of the respondent's household. Since the ATUS allows respondents to list multiple individuals with whom they spent their time, a given activity may potentially fall in groups (ii) and (iii) simultaneously. The ATUS definitions depend on physical proximity. A person is categorized as alone if they are the only person in the room, even if they are on the phone with someone else, answering an e-mail from a friend, or engaged in other forms of virtual socialization.

A second categorization focuses on the familial and interpersonal identities with whom each activity is conducted. In this second categorization, for each activity, I count whether the activity was performed (i) alone, (ii) with a spouse or partner, (iii) with a child in the household, (iv) with a non-spouse, non-child relative, (v) with a friend, or (vi) with any other individual ("an acquaintance"). See Appendix A for the list of people included within each of these six categories.

For each individual i in the ATUS sample, I compute the share of time spent with individuals in category θ (with the understanding that θ may index the "alone" category). In computing this average, I include only activities for which the respondent was asked with whom they spent their time and exclude time spent at work.[6] I denote $x_{\theta,it}$ as the share of "eligible time" person i who is sampled in year t spent with individuals in category θ.

In addition to measuring with whom individuals spend their time, I consider the types of activities respondents pursue. I group activities into the following seven categories: (i)

[5]Beginning in 2006, high school students were not asked whom they were with while at school. Since high school attendance is so concentrated among individuals aged 15 to 17, to maintain consistency within the sample period, I drop this small subset of individuals.

[6]The ATUS refrains from asking its respondents with whom they spend their time for certain sets of activities. These include private activities, such as sleeping, showering, and getting ready to sleep. I cannot examine trends for these activities. I additionally exclude work activities from my analysis for two reasons. First, while time alone is associated with lower subjective well-being for non-work activities, the same is not true for work activities. At work, there does not seem to be an association between alone time and subjective well-being. So, any greater time alone at work, to the extent that it exists, would not have had the same implications for subjective well-being. Second, the ATUS only includes information on with whom respondents spent their time during work activities beginning in 2010. To maintain consistency throughout the 2003 to 2022 sample, I would need to omit work activities. Between 2010 and 2019, there were essentially no trends in work time spent alone. Between 2019 and 2022, the alone share of work time increased by 15 p.p., with greater-than-average increases in alone time for college graduates, smaller-than-average increases for Hispanic individuals compared to non-Hispanic Whites, and no differences across sex or broad age categories of young vs. old.

Table 1: Summary Statistics

Panel A: Hours, by Activity	2003	2019	2022										
Childcare	0.51	0.45	0.44										
Eating	1.23	1.18	1.23										
Home Production	1.76	1.67	1.76										
Leisure At Home	3.79	4.06	4.28										
Leisure Outside	1.36	1.20	0.99										
Other Eligible Time	2.61	2.43	2.21										
Panel B: Share, by Companion	Time Alone			With Indivs. from Other HHs			With Indivs. from the Same HH			Count			
Demographic Group	2003	2019	2022	2003	2019	2022	2003	2019	2022	2003	2019	2022	All Years
Entire Sample	0.435	0.487	0.497	0.219	0.173	0.143	0.402	0.383	0.393	19,757	9,183	7,970	227,191
≤High School	0.429	0.504	0.515	0.220	0.162	0.135	0.401	0.368	0.374	8,465	2,923	2,296	85,247
Some College	0.445	0.499	0.509	0.238	0.190	0.153	0.372	0.352	0.374	3,772	1,547	2,072	63,251
≥College	0.439	0.467	0.473	0.207	0.177	0.145	0.419	0.408	0.423	7,520	4,713	3,602	78,693
Young (Age≤49)	0.389	0.438	0.452	0.241	0.185	0.152	0.429	0.424	0.428	11,684	4,183	3,400	120,250
Old (Age≥50)	0.510	0.544	0.548	0.184	0.160	0.132	0.357	0.337	0.354	8,073	5,000	4,570	106,941
Low HH Income	0.469	0.539	0.548	0.219	0.168	0.141	0.354	0.324	0.333	6,840	3,856	2,763	84,141
Medium HH Income	0.417	0.472	0.484	0.221	0.170	0.144	0.422	0.400	0.410	6,144	2,811	3,797	74,235
High HH Income	0.400	0.434	0.439	0.223	0.184	0.143	0.448	0.444	0.460	4,424	2,516	1,410	55,709
Male	0.445	0.509	0.515	0.217	0.161	0.133	0.386	0.367	0.381	8,573	4,172	3,621	99,639
Female	0.426	0.466	0.480	0.221	0.185	0.152	0.416	0.399	0.405	11,184	5,011	4,349	127,552
White, Non-Hispanic	0.439	0.474	0.486	0.218	0.178	0.148	0.404	0.399	0.403	14,495	6,252	5,542	154,830
Non-White	0.465	0.551	0.556	0.236	0.161	0.121	0.344	0.314	0.345	3,237	1,804	1,526	43,902
White, Hispanic	0.372	0.460	0.458	0.200	0.168	0.154	0.470	0.407	0.424	2,025	1,127	902	28,459

Notes: Panel A presents time spent in eligible activities (hours per day). These are activities, excluding work, for which a survey respondent provides information on the identity of the person with whom the activity was performed. The total amount of eligible time is 11.27 hours per day in 2003, 11.00 hours per day in 2019, and 10.91 hours per day in 2022. Panel B provides the fraction of eligible time that is spent alone, with individuals from other households, or with individuals from the same household. Since activities may be simultaneously performed with individuals from other households and individuals from the same household, the three shares may sum to greater than 1. "Low", "medium," and "high" income refer to terciles of family income within the sample year.

time at work, (ii) leisure at home, (iii) leisure outside of the home, (iv) eating, (v) home production, (vi) childcare activities, and (vii) miscellaneous activities. Appendix A lists the activities within each of these categories.

Table 1 summarizes the sample: It contains 20 years of data, covering time diaries for 227,000 individuals. The first year of the sample, 2003, had approximately twice as many observations as in other years. Panel A presents the average time spent within activity categories, looking within the approximately 11 hours per day for which the ATUS asks respondents whom they were with. Over our sample period, leisure at home grew from 3.8 hours per day in 2003 to 4.1 hours per day in 2019, further increasing to 4.3 hours per day by 2022. (Since time use in 2020, 2021, and 2022 is uniquely affected by the COVID-19 pandemic, throughout the paper I will tend to report values for both 2019 and 2022 when describing the end of the sample.) Between 2003 and 2019, time spent on childcare and leisure outside of the home declined, each by about 10 percent. Between 2019 and 2020, leisure outside of the home fell further, from 1.2 to 0.5 hours per day, then rebounded to 1.0 hours per day by 2022. So, overall, there was a transition of leisure from outside of the home to within the home, with a substantial portion of these changes occurring during the pandemic.

Panel B of Table 1 provides an initial glimpse at time alone, time with individuals from other households, and time with individuals from the respondent's household. At the start of the sample, individuals spent approximately 43.5 percent of their eligible time alone. This figure was lower for females relative to males, White relative to non-White individuals, and younger relative to older individuals. There was little, if any, educational gradient. The fraction of individuals' time spent alone increased by 6.2 percentage points (to 49.7 percent), with about 1.1 p.p. of the increase occurring between 2019 and 2022. The increase in time alone is concentrated in individuals without any college education (a 7.5 p.p. increase between 2003 and 2019; a 8.6 p.p. increase between 2003 and 2022), younger individuals, individuals from lower-income households, and non-White and Hispanic individuals. Furthermore, time spent with individuals from other households declined considerably, with little change in time spent with individuals from the respondent's own household.

But to what extent do these changes reflect changes in the composition of individuals or activities that have occurred within the sample period? I address this question in the following section.

4 Trends in Time Alone and with Others

In this section, I examine trends in how and with whom survey respondents spend their time. I first demonstrate that individuals' eligible time increasingly takes place alone, then explore

heterogeneity in the extent to which alone time has increased since 2003 (Section 4.1). I then examine the channels of substitution: What types of interactions have diminished over the twenty-first century to make way for increasing time alone? I find in Section 4.2 that time spent with people from outside the respondent's own household accounts for much of the increase in alone time. (On average, time spent with people from the respondent's own household saw little change.) However, there are important differences across demographic groups in trends in the share of time spent with people from the same vs. other households. In Section 4.3, I show that Americans are increasingly spending their time alone watching television and, within the last few years, playing video games.

4.1 How Has Alone Time Changed for Different Demographic Groups?

To begin, I apply a regression specified by Equation 1, below:

$$x_{a,it} = \beta_{a,t} + \theta'_a \mathbf{X_{i,t}} + \varepsilon_{a,it}, \tag{1}$$

where the "a" subscript is shorthand for "alone"; $x_{a,it}$ equals the fraction of eligible time that is spent alone by individual i, sampled in year t; $\beta_{a,t}$ are year fixed effects; and $\mathbf{X_{i,t}}$ is a vector of controls. Figure 1 presents estimates of Equation 1. The green circles plot estimates of $\beta_{a,t}$, with the day of the week that the survey was administered and the month of the survey as only two sets of controls included in $\mathbf{X_{i,t}}$.[7] Relative to 2003, the fraction of time spent alone increased by 5.2 p.p. by 2019 and an additional 1.1 p.p. between 2019 and 2022.[8]

Some of the differences in time spent alone may be due to changes in the demographics of the sample: Since 2003, survey participants have become older, more educated, less likely to be White, less likely to be employed, and so on. The hollow squares within Figure 1 indicate that changes in the demographic composition account for some of the trends in time alone. Controlling for age, race, ethnicity, and sex reduces the 2003 to 2022 trend in the fraction

[7]Individuals' time use patterns differ markedly between weekdays and weekends, with greater time alone on weekdays. In addition, there is some slight seasonality to the share of alone time, which is relatively high in September and October and relatively low in July and August. However, to the extent that the ATUS sample is balanced on day-of-week and month-of-the-year, as it is with the appropriate sample weights, inclusion or exclusion of these controls should have no impact on estimates of $\beta_{a,t}$.

[8]In Appendix Table B.1, I consider alone time in 2020, 2021, and 2022: directly before, during, and immediately after the COVID-19 pandemic. Though there is considerable noise with quarterly averages, the share of time spent alone was higher by approximately 2 p.p. in 2020Q3 to 2021Q1 relative to other quarters within this three-year period. Frazis (2022) discusses alone time during the COVID-19 pandemic in greater detail.

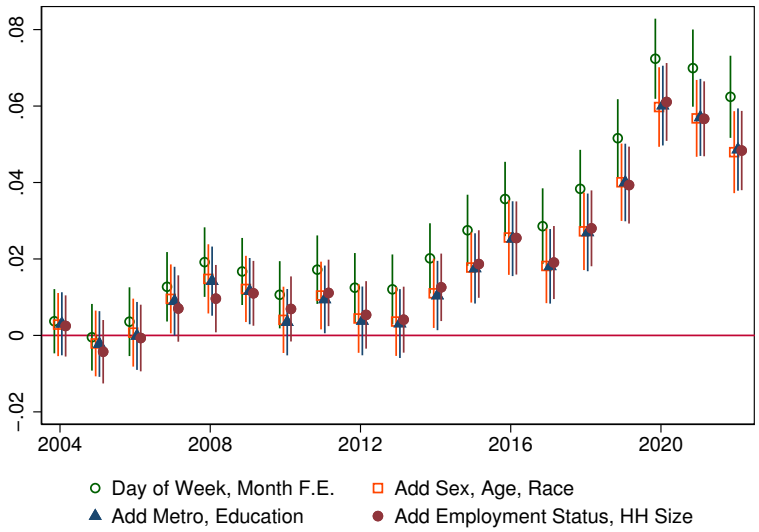

Figure 1: Trends in Time Spent Alone

Notes: This figure presents estimates of $\beta_{a,t}$ from Equation 1; 2003 is the omitted (reference) year. The basic set of controls includes a day-of-week fixed effect and a month fixed effect. "Age" is a categorical variable, describing the age of the respondent: 18-29, 30-39, 40-49, 50-59, 60-69, or 70 or older; "race" is a category variable, whether the respondent identifies as a non-Hispanic White, a Hispanic White, or a non-White individual; "education" is a categorical variable, with less than or equal to high school education, some college education, or college education or more as the three categories; "metro status" is an indicator for whether the household is in the central city of an MSA; "employment" has five categories (employed at work, employed and absent, unemployed on layoff, unemployed and looking for a job, or not in the labor force); "HH Size" refers to the logarithm of the number of individuals in the respondent's household. The figure includes 1.96 standard-error confidence intervals computed based on robust standard errors.

of time spent alone to a 4.8 p.p. increase. Additional controls for education, metropolitan status (whether the individual lives in the center city within an MSA or not), employment status, and the logarithm of the number of people within the respondent's household have a minimal effect.[9]

As Table 1 indicates, trends in time alone differ according to education, sex, race, ethnicity, age, and household income. To assess these differential trends more formally, I modify Equation 1, allowing the regression coefficients to vary according to the demographic characteristics of the individual; see Equation 2. All regressions include controls for age, race and ethnicity, education, sex, metropolitan status, and employment status, each interacted with the group g:

$$x_{a,it} = \sum_{g \in \mathcal{G}} \left(\beta_{a,g(i),t} + \theta'_{a,g(i)} \mathbf{X_{i,t}} \right) + \varepsilon_{a,it}. \tag{2}$$

Figure 2 presents estimates of $\beta_{a,g(i),t}$ from Equation 2 with $g \in \mathcal{G}$ representing different demographic group categories. The top left panel of this figure indicates that alone time increased by 6.0 p.p. for individuals without any college education between 2003 and 2019, then increased by an additional 3.2 p.p. between 2019 and 2020. Over the whole sample period, the share of eligible time that is spent alone increased by 7.2 p.p. for individuals with at most a high school degree. For individuals with a college degree, relative to 2003, the share of eligible time that is spent alone increased by 1.3 p.p. from 2003 to 2019 and 1.7 p.p. from 2003 to 2022. The other three panels of Figure 2 plot trends according to individuals' household income (top right panel), race and ethnicity (bottom left panel), and age (bottom right panel). The increase in alone time was greatest for low-household-income individuals (increasing by 5.1 p.p. from 2003 to 2019 and 6.0 p.p. to 2022), non-White individuals (increasing by 7.4 p.p. between 2003 and 2019), and younger individuals (increasing by 6.1 p.p. between 2003 and 2019).

When looking across demographic groups, are the differences in alone time growth statistically significant? Table 2 allows us to answer this question. It presents regression results from a modified version of Equation 2:

$$x_{a,it} = \gamma_t + \sum_{g \in \mathcal{G}, g \neq g^r} \left(\gamma_{a,g(i),t} + \theta'_{a,g(i)} \mathbf{X_{i,t}} \right) + \varepsilon_{a,it}. \tag{3}$$

[9]Whether to include certain controls — such as the number of individuals in the household — is open to debate. Declines in household size may represent a manifestation of increasing social isolation, and not an immutable characteristic — like age or race — that we wish to "control" for. Nevertheless, the fact that the $\beta_{a,t}$ coefficients are unchanged with the inclusion of household size as a covariate signifies that my results are not merely a reflection of declining household sizes.

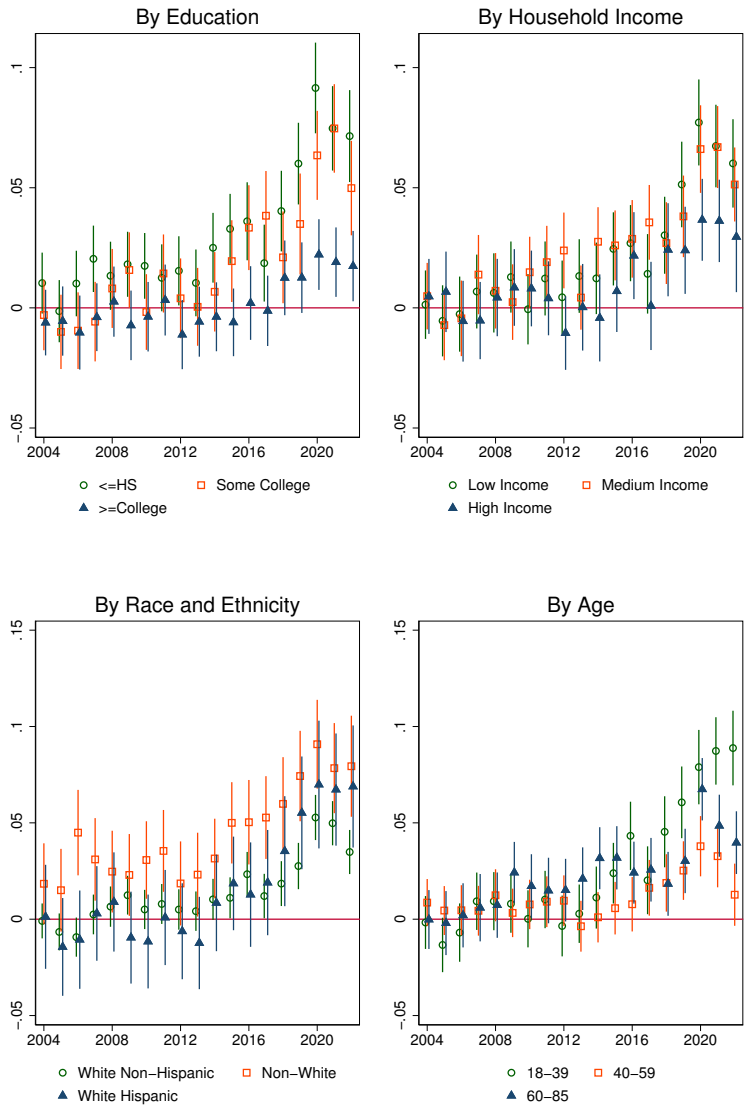

Figure 2: Trends in Time Spent Alone across Demographic Groups

Notes: Each panel presents estimates of $\beta_{a,g(i),t}$, with 2003 as the reference year. I apply the most extensive set of controls that were used in Figure 1. The figure includes 1.96 standard-error confidence intervals computed based on robust standard errors.

In Equation 3, $\gamma_{a,g(i),t}$ refers to the year fixed effect for group g in year t *relative* to the corresponding estimate for a reference demographic group (call this g^r). Equations 2 and 3 are linked: For an individual in the reference group, $\beta_{a,g(i),t} = \gamma_t$. For individuals in other groups, $\gamma_{a,g(i),t} = \beta_{a,g(i),t} - \beta_{a,g^r,t}$. For example, in the first panel, the reference group includes individuals with a 4-year college degree. So, the first column indicates that between 2003 and 2019, alone time increased by 4.7 p.p. *more* for those with high school degrees or less relative to those with college degrees. Further, the difference in growth rates is statistically significant. The coefficients corresponding to other years suggest that this gap grew larger in 2020, before narrowing somewhat in the latter stages of the pandemic period.

Panels B through E present analogous comparisons according to household income, race and ethnicity, age, and sex. Between 2003 and 2019, the alone share of eligible time increased by 4.7 p.p. more for non-White individuals relative to non-Hispanic White individuals; by 2.7 p.p. more for people from low-income versus high-income households; by 2.0 p.p. more for males relative to females; and by 3.0 p.p. more for individuals younger than 40 years old relative to those who are older than 60. These differences in the growth of alone time are all statistically significant. Furthermore, relative to the overall amount of time that most individuals spend alone (approximately 40 to 50 percent of their eligible time; see the first row of panel B of Table 1), these differential trends are substantial. There is some evidence that gaps in alone time increased over the course of the pandemic: Age, race and ethnicity, education, and household income-based gaps were, if anything, larger in 2022 than in 2019. The one exception may be sex, where there is some weak evidence that alone time increased more for women than men over the course of the pandemic, reversing pre-pandemic trends.

4.2 With Whom Are Americans Spending Less Time?

If Americans are spending more of their time alone, with whom are they spending less time? To address this question, I estimate Equations 4 and 5:

$$x_{o,it} = \sum_{g \in \mathcal{G}} \left(\beta_{o,g(i),t} + \theta'_{o,g(i)} \mathbf{X_{i,t}} \right) + \varepsilon_{o,it} \text{ , and} \tag{4}$$

$$x_{s,it} = \sum_{g \in \mathcal{G}} \left(\beta_{s,g(i),t} + \theta'_{s,g(i)} \mathbf{X_{i,t}} \right) + \varepsilon_{s,it} \text{ .} \tag{5}$$

Equations 4 and 5 are equivalent to Equation 2 with new dependent variables: the share of eligible time spent with people from outside of one's household ("o" is shorthand for "outside" of one's household, or for "other" households) and the share of eligible time spent with people from the same household ("s" is shorthand for "same" household). Figure 3 presents estimates of $\beta_{o,g(i),t}$ (in the top panels) and $\beta_{s,g(i),t}$ (in the bottom panels) for two sets

Table 2: Estimates of Equation 3: Trends in Time Alone

	(1)	(2)	(3)	(4)
	$\gamma_{a,g(i),2019}$	$\gamma_{a,g(i),2020}$	$\gamma_{a,g(i),2021}$	$\gamma_{a,g(i),2022}$
Panel A: Education				
	0.047***	0.069***	0.056***	0.054***
High School or Less	(0.011)	(0.012)	(0.012)	(0.012)
	[0.001]	[0.001]	[0.001]	[0.001]
	0.022	0.041***	0.056***	0.032**
Some College	(0.013)	(0.012)	(0.012)	(0.013)
	[0.113]	[0.003]	[0.001]	[0.023]
Panel B: Household Income				
	0.027*	0.041***	0.031**	0.031*
Low Income	(0.013)	(0.013)	(0.012)	(0.015)
	[0.055]	[0.005]	[0.026]	[0.063]
	0.014	0.029**	0.031**	0.022
Medium Income	(0.013)	(0.013)	(0.012)	(0.014)
	[0.298]	[0.038]	[0.026]	[0.153]
Panel C: Race and Ethnicity				
	0.047***	0.038**	0.029*	0.045***
Non-White	(0.013)	(0.013)	(0.013)	(0.015)
	[0.003]	[0.011]	[0.052]	[0.007]
	0.028	0.017	0.017	0.034*
Hispanic Whites	(0.016)	(0.018)	(0.016)	(0.017)
	[0.113]	[0.361]	[0.299]	[0.067]
Panel D: Age Group				
	0.035**	0.041***	0.055***	0.076***
Age: 18-39	(0.012)	(0.013)	(0.012)	(0.013)
	[0.011]	[0.005]	[0.001]	[0.001]
	0.005	0.030**	0.016	0.027**
Age: 60-85	(0.012)	(0.011)	(0.012)	(0.012)
	[0.665]	[0.023]	[0.211]	[0.038]
Panel E: Sex				
	0.020*	0.024**	0.011	0.009
Male	(0.010)	(0.010)	(0.010)	(0.011)
	[0.067]	[0.040]	[0.298]	[0.409]

Notes: The table presents regression results based off of estimates of Equation 3. Across the different panels, the base group includes individuals with a 4-year college degree (panel A), individuals from high-income households (panel B), non-Hispanic White individuals (panel C), individuals aged 40 to 59 (panel D), and females (panel E). Each panel presents estimates from a separate, single regression of $\gamma_{a,g(i),t}$ for $t = 2019$, 2020, 2021, and 2022. In addition to these explanatory variables, the regression includes $\gamma_{a,g(i),t}$ for each t between 2004 and 2018, dummy variables $\gamma_{a,t}$ for each year between 2003 and 2022, and all of the controls listed in Figure 1 (with coefficients allowed to vary be demographic group). The sample contains 227,191 individuals. Robust standard errors are in parentheses; p-values, correcting for multiple comparisons using the method of Benjamini and Hochberg (1995) and Anderson (2008), are in square brackets. ***: p-value< 0.01; **: p-value$\in [0.01, 0.05)$; *: p-value$\in [0.05, 0.10)$.

of demographic groups: across educational (left panels) and racial and ethnic groups (right panels).[10] In aggregate, increases in time spent alone are of equal magnitude to decreases in time spent with people from other households. According to the top left panel of Figure 3, between 2003 and 2019 the share of time spent with people from other households declined by 5.6 p.p. for individuals with a high school education or less. Between 2003 and 2022, the decline was even greater at 8.2 p.p. What is more, the share of time spent with people from other households fell by 7.3 p.p. between 2003 and 2019, and by 10.8 p.p. between 2003 and 2022, for non-White individuals. Overall, time spent with people from other households has declined by more than one-third since 2003. In contrast, the bottom panels of Figure 3 reveal much more modest changes in the share of time spent with others from the respondent's own household.

For understanding differential growth rates in alone time across demographic groups, trends in time spent with people from the same household and with those from other households are both important. In Tables 3 and 4, I present estimates of the following two regressions:

$$x_{o,it} = \gamma_t + \sum_{g \in \mathcal{G}, g \neq g^r} \left(\gamma_{o,g(i),t} + \theta'_{o,g(i)} \mathbf{X_{i,t}} \right) + \varepsilon_{o,it} \text{ , and} \tag{6}$$

$$x_{s,it} = \gamma_t + \sum_{g \in \mathcal{G}, g \neq g^r} \left(\gamma_{s,g(i),t} + \theta'_{s,g(i)} \mathbf{X_{i,t}} \right) + \varepsilon_{s,it} \text{ .} \tag{7}$$

The coefficients $\gamma_{o,g(i),t}$ and $\gamma_{s,g(i),t}$ characterize growth (or decline) in time spent with others for individuals in group g relative to individuals in reference group g^r. For instance, the final column of Table 3 indicates that between 2003 and 2022 time spent with individuals from other households decreased by 2.3 p.p. more for high-school-or-less than for college-educated individuals. For time spent with individuals from the same household, this differential is 3.4 p.p. (see the final column of Table 4). In short, for understanding differences in time alone across education groups, interpersonal interactions within and across households each play a role. Although only of marginal statistical significance, differences in trends across income groups are more salient for time spent with other people from the respondent's same household. In contrast, when looking across age groups or when comparing White and non-White individuals, there are significant differences in the trends of time spent with people from other households.[11]

[10] The focus on education and race here and in Section 4.3 is motivated by Section 5's goal of quantifying the importance of differential trends in time alone for subjective well-being inequality. These sets of characteristics are both (essentially) fixed throughout one's adulthood and explain a considerable share of the variation in individuals' income, consumption, and overall standard of living.

[11] In Appendix Figures B.1 and B.2, I apply a second categorization, exploring time use with friends, with one's spouse or partner, with one's children, or with other relations. Among these four groups of companions, time with friends fell the most: by 3.0 p.p. between 2003 and 2019 and by 4.5 p.p. between 2003 and 2022.

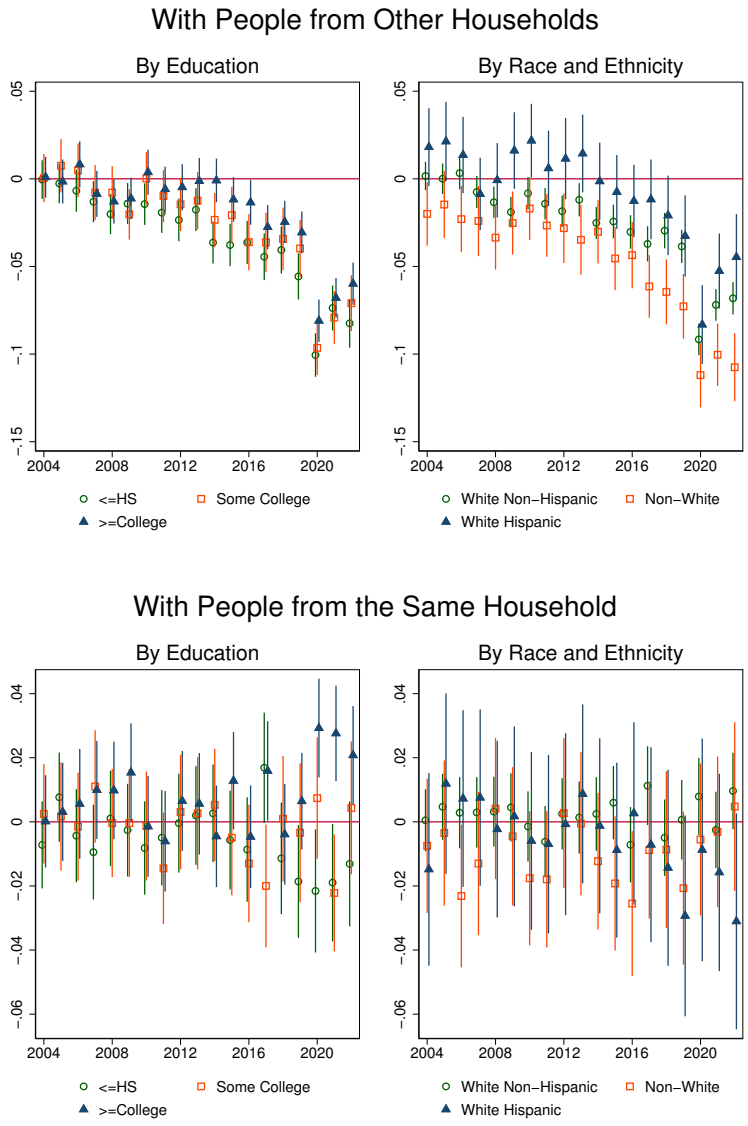

Figure 3: Trends in Time Spent with People from Other Households or One's Own Household Notes: In each panel, I plot estimates of either $\beta_{o,g(i),t}$ or $\beta_{s,g(i),t}$ from Equations 4 and 5; 2003 is the omitted (reference) year. In the left panels, individuals are grouped according to their educational background; in the right panels, individuals are grouped according to their race and ethnicity. In the top panels, the dependent variable is the fraction of eligible time spent with individuals outside of the respondent's household; in the bottom panels, the dependent variable is the fraction of eligible time spent with individuals from the respondent's household. See the notes for Figure 1 for the additional controls included in the regression. The figure includes 1.96 standard-error confidence intervals computed based on robust standard errors.

In sum, in the aggregate, decreases in time spent with people from other households are similar in magnitude to the increase in time alone. However, for understanding differences across demographic groups, both within-household and across-household interactions are salient.

4.3 What Activities Account for the Increase in Alone Time?

What activities account for increasing alone time, especially among less educated individuals, among males, and among non-White individuals?

To begin addressing this question, I re-estimate Equation 2 with a new dependent variable: the share of eligible time that is spent alone while pursuing leisure at home. Leisure-at-home time increased for all demographic groups. However, less educated individuals and non-White individuals increasingly spent this leisure-at-home time alone. Between 2003 and 2019, the share of eligible time spent alone pursuing leisure at home increased by 4.4 p.p. for high-school-or-less individuals (compared to 0.4 p.p. for college-educated individuals) and 4.2 p.p. for non-White individuals (compared to 2.2 p.p. for non-Hispanic White individuals); see the top two panels of Figure 4. These differences are largely due to increasing time spent alone watching television, at least between individuals of differing education levels: Between 2003 and 2019, the fraction of time spent alone watching TV increased by 2.9 p.p. more for those with at most a high school education relative to those with a college degree. Again, these are exceptionally large differentials, amounting to 2 to 3 hours per week of increased TV watching alone.

In the bottom panels of Figure 4, I present trends in time that is spent at leisure outside of the household *and* with other individuals. Leisure time with others outside of the household decreased for all demographic groups, but I estimate exceptionally large decreases for those with a high school education or less, low-income households, and non-White individuals. The decline in leisure outside of the home and with others can largely be tied to a handful of activities: Socializing or communicating with others (activity code 120101) accounts for a plurality of the decline. Attending parties and receptions, attending religious services, travel related to socializing, and travel related to religious services are less prominent but also important.

What role do new digital communication technologies play in reshaping individuals' time spent alone? In Figure 5, I consider trends in the share of time spent alone while answering e-mails (activity code 020904), on the computer (activity code 120308), using the telephone for social purposes (activity codes 160101 and 160102), or playing games (activity code 120307).

Furthermore, time spent with friends declined significantly less for non-Hispanic White relative to non-White individuals. Time spent with one's spouse or partner was flat overall, but the net change was considerably higher for college-educated relative to high-school-or-less individuals.

Table 3: Estimates of Equation 6: Time Spent with People from Other Households

	(1)	(2)	(3)	(4)
	$\gamma_{o,g(i),2019}$	$\gamma_{o,g(i),2020}$	$\gamma_{o,g(i),2021}$	$\gamma_{o,g(i),2022}$
Panel A: Education				
	-0.025**	-0.020*	-0.006	-0.023*
High School or Less	(0.009)	(0.009)	(0.009)	(0.009)
	[0.026]	[0.089]	[0.635]	[0.065]
	-0.009	-0.015	-0.011	-0.011
Some College	(0.010)	(0.010)	(0.010)	(0.010)
	[0.518]	[0.246]	[0.382]	[0.413]
Panel B: Household Income				
	-0.013	0.009	0.002	-0.002
Low Income	(0.010)	(0.010)	(0.010)	(0.012)
	[0.335]	[0.494]	[0.881]	[0.881]
	-0.016	-0.001	-0.006	-0.003
Medium Income	(0.011)	(0.010)	(0.010)	(0.012)
	[0.271]	[0.954]	[0.695]	[0.861]
Panel C: Race and Ethnicity				
	-0.034***	-0.020	-0.028**	-0.039***
Non-White	(0.011)	(0.010)	(0.010)	(0.011)
	[0.008]	[0.154]	[0.026]	[0.003]
	0.006	0.008	0.019	0.024
Hispanic Whites	(0.013)	(0.012)	(0.012)	(0.013)
	[0.745]	[0.635]	[0.216]	[0.190]
Panel D: Age Group				
	-0.039***	-0.045***	-0.046***	-0.039***
Age: 18-39	(0.010)	(0.010)	(0.010)	(0.010)
	[0.002]	[0.001]	[0.001]	[0.002]
	0.014	-0.002	0.007	0.015
Age: 60-85	(0.008)	(0.008)	(0.008)	(0.008)
	[0.214]	[0.861]	[0.518]	[0.176]
Panel E: Sex				
	-0.019*	-0.010	-0.011	-0.015
Male	(0.008)	(0.008)	(0.008)	(0.008)
	[0.066]	[0.335]	[0.271]	[0.176]

Notes: See the notes for Table 2. By contrast, this table examines trends in time spent on activities with people from other households.

Table 4: Estimates of Equation 7: Time Spent with People from the Same Household

	(1)	(2)	(3)	(4)
	$\gamma_{s,g(i),2019}$	$\gamma_{s,g(i),2020}$	$\gamma_{s,g(i),2021}$	$\gamma_{s,g(i),2022}$
Panel A: Education				
	-0.025	-0.051***	-0.047***	-0.034**
High School or Less	(0.012)	(0.013)	(0.012)	(0.013)
	[0.123]	[0.001]	[0.002]	[0.041]
	-0.010	-0.022	-0.050***	-0.016
Some College	(0.013)	(0.012)	(0.012)	(0.013)
	[0.558]	[0.209]	[0.001]	[0.388]
Panel B: Household Income				
	-0.016	-0.041**	-0.023	-0.020
Low Income	(0.013)	(0.013)	(0.013)	(0.015)
	[0.388]	[0.019]	[0.206]	[0.346]
	-0.005	-0.026	-0.022	-0.013
Medium Income	(0.013)	(0.013)	(0.013)	(0.014)
	[0.835]	[0.163]	[0.222]	[0.512]
Panel C: Race and Ethnicity				
	-0.021	-0.013	-0.001	-0.005
Non-White	(0.014)	(0.014)	(0.013)	(0.015)
	[0.269]	[0.485]	[0.965]	[0.835]
	-0.030	-0.017	-0.013	-0.041
Hispanic Whites	(0.017)	(0.019)	(0.017)	(0.018)
	[0.209]	[0.512]	[0.536]	[0.103]
Panel D: Age Group				
	0.003	-0.003	-0.013	-0.039**
Age: 18-39	(0.013)	(0.013)	(0.013)	(0.013)
	[0.854]	[0.854]	[0.485]	[0.026]
	-0.010	-0.029*	-0.017	-0.031**
Age: 60-85	(0.012)	(0.012)	(0.012)	(0.012)
	[0.536]	[0.064]	[0.302]	[0.041]
Panel E: Sex				
	0.002	-0.011	0.009	0.014
Male	(0.011)	(0.011)	(0.010)	(0.010)
	[0.873]	[0.479]	[0.512]	[0.388]

Notes: See the notes for Table 2. By contrast, this table examines trends in time spent on activities with people from the respondent's same household.

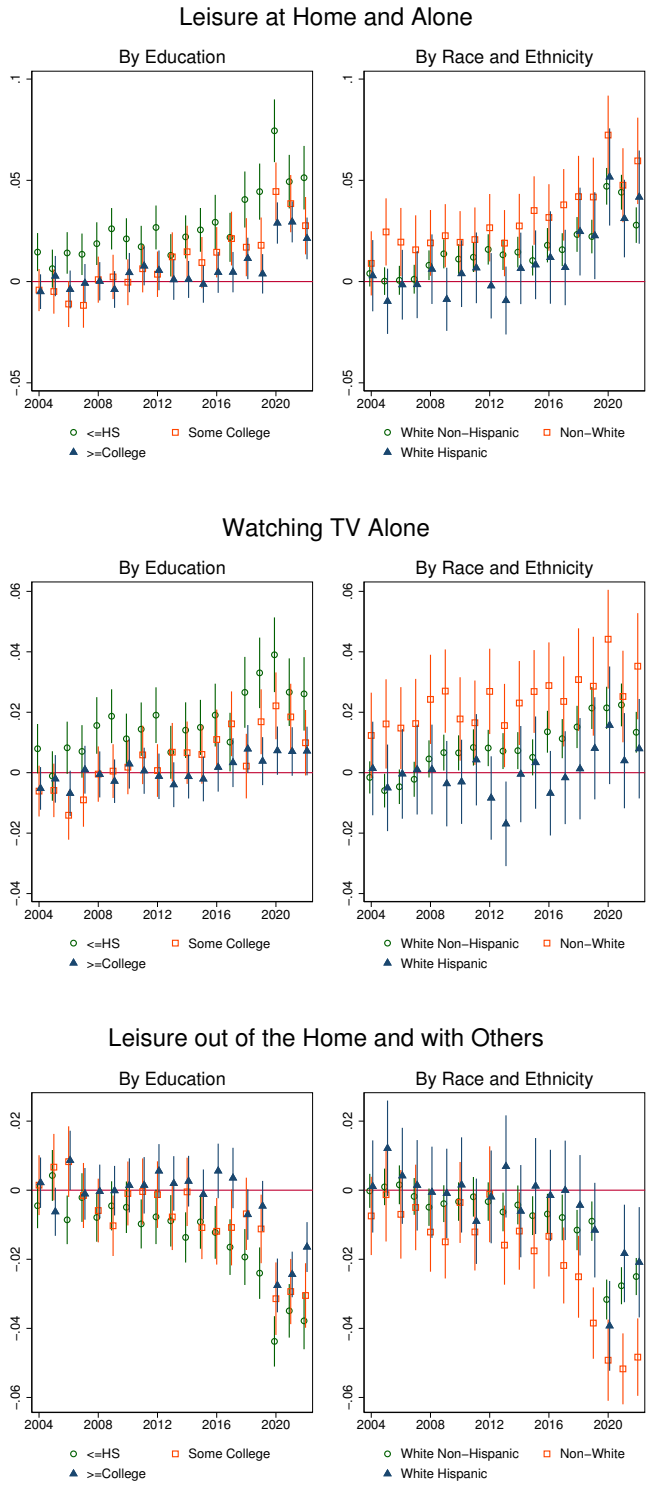

Figure 4: Trends in Time Spent on Leisure Activities: Home and Alone Versus with Others and Out of the House

Notes: The top panels present the coefficients of year dummies on the fraction of eligible time that is spent on leisure at home and alone. The middle panels present the coefficients of year dummies on the fraction of eligible time that is spent watching TV at home and alone. The bottom panels present the coefficients of year dummies on the fraction of free time that is spent on leisure outside of the household and with others. In each panel, 2003 is the omitted year. See the notes for Figure 1 for the additional controls included in the regression. The figure includes 1.96 standard-error confidence intervals computed based on robust standard errors.

While not in close physical proximity, individuals may be relating to other individuals while engaged in these activities. To the extent that individuals are increasingly pursuing these activities, and to the extent that individuals form and maintain meaningful social ties during these activities, trends in alone time — which rely on ATUS definitions of physical proximity — used elsewhere in this paper may conceivably overstate the decline in social isolation experienced during the sample period. Whether this is the case depends, in turn, on whether virtual socialization provides the emotional support afforded by traditional, in-person social relationships.[12]

First, between 2003 and 2019, I find a modest increase — by about 0.2 p.p. — in the share of eligible time during which individuals are alone and answering e-mails, on the computer, or on the telephone (top panels of Figure 5). Between 2019 and 2022, this share increased by a further 0.4 p.p. Compared to White individuals, non-White individuals may be increasingly categorized as alone while on the computer, answering e-mails, or on the phone.

In the next four panels of Figure 5, I present trends in time spent alone and playing games. (Video games are included within this category. As some of these video games are played online with other individuals, they may represent another form of virtual socialization.) The amount of time spent alone and playing games increased by approximately 0.8 p.p. between 2003 and 2019, and an additional 0.7 p.p. between 2019 and 2022. These increases were significantly larger for those with less education: The share of time spent playing games alone (again, likely playing games online) increased by 1.1 p.p. between 2003 and 2019, and an additional 1.0 p.p. between 2019 and 2022. These increases are roughly double those of people with a 4-year college degree. In contrast to the results presented elsewhere in this section, there is no systematic increase in time spent alone while playing games across individuals from different ethnic and racial groups. (Moreover, un-plotted, there are no significant differences in 2003 to 2022 trends in the amount of time spent alone while playing games between individuals from high-income, middle-income, and low-income households.)

Differences according to sex or age are much starker. As the bottom two panels of Figure 5 indicate, the amount of time that individuals spend alone and playing games has increased considerably more for younger individuals and for males. Consistent with Kimbrough (2019),

[12]To address this question, consider the 725 individual-activity observations within the 2010, 2012, and 2013 ATUS for which respondents' subjective well-being was recorded while engaged in the "gaming" activity, the 955 observations in which the respondent is engaged in the "computer" activity, or the 430 observations while writing e-mails. Among these observations, ATUS survey respondents reported lower happiness levels when alone at 4.13 (on a scale of 0 of 6) compared to 4.60 when with others. Net affect — which is defined as the difference between happiness and reported negative emotions within the ATUS questionnaire — was 3.05 when alone and 3.54 when in the physical presence of others. These differences are, for the most part, concentrated among gaming activities. In sum, at least in terms of individuals' own stated subjective well-being, being in the physical presence of others matters when engaged in digital activities.

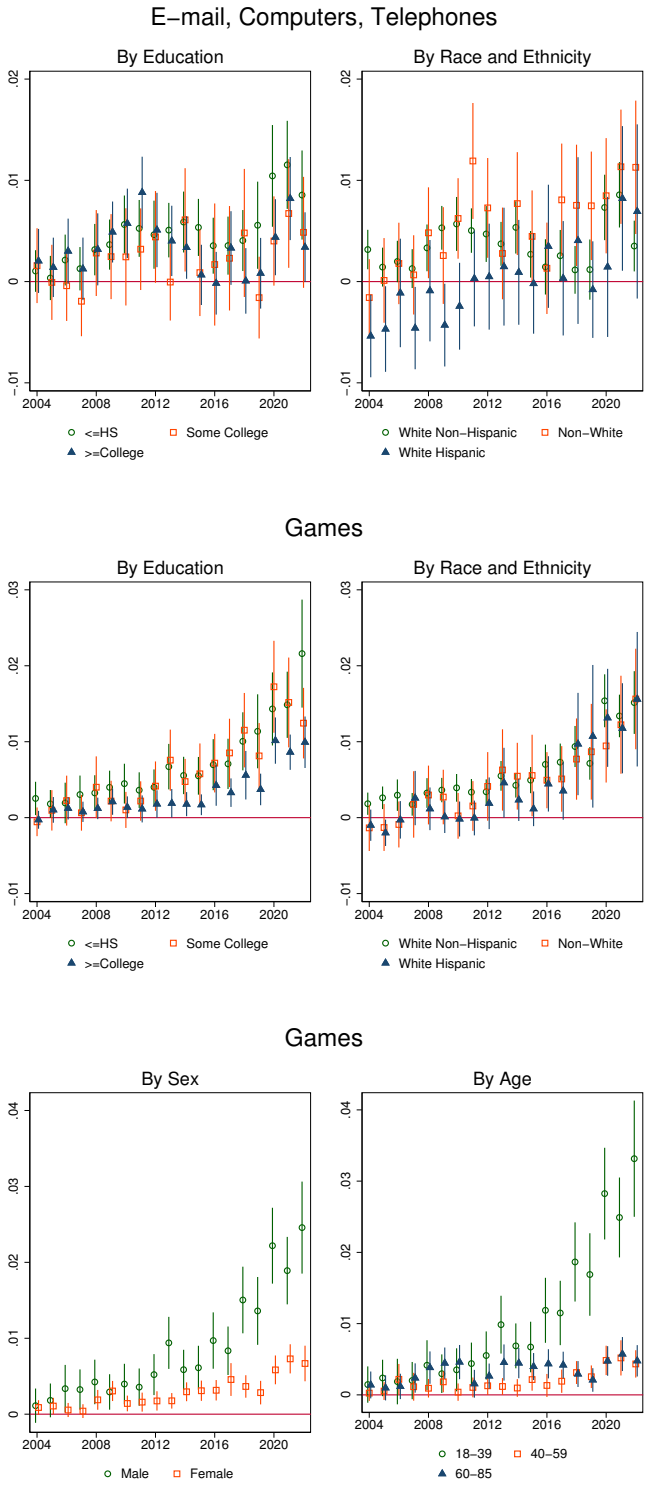

Figure 5: Trends in Time Spent Alone and on Digital Activities
Notes: See the notes for Figure 1 for the list of controls. The figure includes 1.96 standard-error confidence intervals computed based on robust standard errors.

increased time spent on video games can explain up to 2.8 p.p. of the 2003 to 2022 differential trend in the share of time alone between young (age 18 to 39) and old (age 40 and above) individuals, and roughly 1.8 p.p. of the differential trend in time alone between males and females.

In sum, for most of the sample period, time spent watching TV accounts for much of the overall increase and differential trend in time spent alone. Virtual socialization, in particular online gaming, plays a secondary but increasingly important role.

5 Time Alone and Well-Being

In this section, I explore the implications of Section 4's trends in alone time on subjective well-being inequality. In Section 5.1, I describe the subjective well-being measures collected in the ATUS. I show that activities that are pursued alone are rated less favorably by survey respondents. In Section 5.2, I consider stated subjective well-being measures at the individual level. I present the relationship between time spent alone and subjective well-being. Then, to provide a point of comparison, I relate individuals' subjective well-being to their household income. The main conclusion from this exercise is that the increases in time spent alone, as well as the differential increases in time spent alone, that I document in Section 4 represent a salient deterioration of well-being on average and an important component of increasing subjective well-being inequality.

As is now well appreciated, subjective well-being measures are difficult to compare across individuals and time: Bond and Lang (2019) and Bloem (2021) argue that, since survey responses are ordinal variables, comparisons across groups are sensitive to monotonic transformations. Furthermore, economists disagree over the interpretation to ascribe to well-being measures.[13] For these reasons, the results of this section are necessarily more speculative. Nevertheless, they will indicate that the differential trends in time use documented in Section 4 account for a substantial increase in subjective well-being inequality.

[13] Kahneman et al. (2004), Kahneman and Thaler (2006), and Krueger and Schkade (2008) argue that — despite some well-known biases involved (e.g., the focusing illusion; see Kahneman et al., 2006) — subjective well-being measures provide "a useful complement to traditional welfare analysis" (Kahneman and Thaler, 2006, p. 22). In contrast, in their comment on Stevenson and Wolfers (2008), Becker and Rayo (2008) argue that well-being is just one argument in agents' utility functions; it is not a representation of agents' utility. Much of the disagreement over the usefulness of subjective well-being measures hinges on the extent to which individuals' choices reveal their true preferences or suffer from systematic behavioral biases, which would blur the revealed preference approach. MacKerron (2012) and Stone and Mackie (2013) provide comprehensive, balanced reviews on the usefulness and limitations of subjective well-being measures.

5.1 Well-Being Measures

In 2010, 2012, and 2013, the ATUS included a well-being module in which respondents were asked two sets of questions, one related to individuals' assessment of their day-to-day activities ("emotional well-being") and a second related to individuals' assessment of their longer-term well-being ("life satisfaction").

Emotional and Eudaimonic Well-Being Measures

In the first set of questions: for up to three randomly chosen activities within the survey day, respondents rated their happiness, tiredness, sadness, pain, stress, and perceived meaningfulness during the activity on a scale of 0 to 6.[14] For each activity, I consider four summary measures of emotional well-being:

- *happiness*;
- *net affect*, which is the difference between the happiness measure and the average of the four "negative" emotions: tiredness, sadness, pain, and stress;
- the *U-index*, which is an indicator equal to 1 if the happiness measure is lower than at least one of the negative emotion measures; and
- *meaning*, the answer to a single survey question on the meaningfulness of the activity to the survey respondent.

Table 5 presents summary statistics from the 2010, 2012, and 2013 well-being modules of the ATUS. It lists average reported happiness, net affect, U-index values, and meaningfulness for different categories of eligible time. Among the different categories, leisure outside of the home and eating have relatively high happiness, meaning, and net affect and a relatively low U-index. Home production and other non-work time (which includes, primarily, traveling to and from other activities) have relatively low happiness and net affect and relatively high U-indexes. Respondents attribute exceptionally high levels of meaning to childcare activities. Finally, time alone has lower happiness, meaningfulness, and net affect, as well as higher U-indexes. Notably, being alone is so unpleasant that home production with others is associated with higher emotional well-being relative to leisure at home alone.

Do the differences reported in Table 5 reflect differences in the of the different activity categories or differences in the disposition of survey respondents who tend to engage in those activities? To address this question, I estimate a regression with activity-individual

[14] See `https://www.bls.gov/tus/questionnaires/wbmquestionnaire.pdf` for the questionnaire; accessed October 31, 2023.

Table 5: Emotional Well-Being Measures by Activity Group and Alone Status

	Net Affect		U-Index		Happiness		Meaning		Share of Total Eligible Time	
Alone	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No
Eligible Time	2.69	3.45	0.26	0.18	4.08	4.67	3.96	4.61	0.45	0.55
Leisure At Home	2.71	3.27	0.27	0.19	4.08	4.55	3.56	4.15	0.17	0.16
Leisure out of Home	3.30	3.99	0.20	0.12	4.45	4.97	4.31	4.87	0.02	0.10
Eating	2.97	3.82	0.23	0.12	4.22	4.84	3.99	4.73	0.03	0.09
Home Production	2.79	3.03	0.23	0.23	4.14	4.42	4.37	4.69	0.10	0.06
Childcare	3.28	3.78	0.19	0.15	4.60	4.98	4.76	5.34	0.00	0.03
Other Eligible Time	2.36	3.02	0.32	0.23	3.91	4.45	4.13	4.69	0.11	0.11

Notes: The sample includes the 91,230 non-work activities in the 2010, 2012, and 2013 ATUS for which the respondent was asked with whom the activity was performed, the sampling weight was non-missing, and the happiness, stress, pain, tiredness, and sadness scores are all also non-missing. The affect score is the difference between the happiness measure and the arithmetic mean of stress, pain, tiredness, and sadness scores. The U-Index equals 1 only if the happiness score is strictly lower than at least one of the stress, pain, tiredness, and sadness measures. The column subheadings "Yes" and "No" respectively indicate whether the activity was performed alone or not.

Table 6: Emotional Well-Being Measures by Activity Group and Alone Status

Dependent Variable	Net Affect		U-Index		Happiness		Meaning	
Leisure at Home	0.391	0.237	-0.063	-0.020	0.158	0.074	-0.634	-0.565
	(0.065)	(0.040)	(0.010)	(0.007)	(0.042)	(0.023)	(0.044)	(0.038)
Leisure out of Home	1.041	0.488	-0.133	-0.043	0.564	0.206	0.136	0.196
	(0.071)	(0.043)	(0.012)	(0.008)	(0.045)	(0.026)	(0.049)	(0.041)
Eating	0.707	0.429	-0.101	-0.048	0.368	0.192	0.060	0.056
	(0.050)	(0.035)	(0.008)	(0.006)	(0.034)	(0.019)	(0.036)	(0.033)
Home Production	0.276	-0.079	-0.059	-0.001	0.128	-0.097	0.112	-0.116
	(0.061)	(0.042)	(0.010)	(0.006)	(0.041)	(0.021)	(0.041)	(0.035)
Childcare	0.788	0.508	-0.093	-0.053	0.565	0.316	0.686	0.626
	(0.076)	(0.050)	(0.012)	(0.009)	(0.046)	(0.029)	(0.047)	(0.048)
Alone	-0.586	-0.354	0.071	0.040	-0.476	-0.279	-0.532	-0.441
	(0.042)	(0.029)	(0.007)	(0.005)	(0.028)	(0.017)	(0.032)	(0.031)
Person Fixed Effects	No	Yes	No	Yes	No	Yes	No	Yes
Observations	90,567	89,326	90,567	89,326	90,567	89,326	90,567	89,326
Adjusted R^2	0.043	0.755	0.024	0.402	0.042	0.515	0.062	0.638

Notes: The table presents coefficients and robust standard errors from a regression of activity-level emotional well-being measures against types of activity and whether the activity is performed alone. The omitted group is "Other Eligible" activities. In addition, the regression includes controls for the log(duration) as well as the 4-hour period of the day in which the activity occurs. Observations are weighted by the product of the ATUS sample weights and the duration of the activity. Each observation is a separate individual-activity pair.

level observations, different well-being measures as the dependent variable, and activity categories and an alone-status indicator as explanatory variables.[15] In some specifications, I include person fixed effects as controls; in others, I do not.[16] For specifications with respondent fixed effects, the coefficients on the alone status characterize within-individual differences in subjective well-being across different groups of activities. Table 6 reports the results from this regression. As with Table 5, Table 6 indicates that time spent alone is associated with lower subjective well-being. The differences associated with aloneness are smaller when person fixed effects are included but still sizable, at about 20 percent smaller for meaning and 40 percent smaller for the other three emotional well-being measures. So, even holding fixed the individual respondent, activities conducted alone are less pleasurable.

In Appendix Tables C.1 and C.2, I show that results are robust to (i) weighting activities equally rather than according to their duration, and (ii) looking at individual negative affect measures individually. Further, in Appendix C.3 I estimate a more comprehensive specification in which activity category and alone status terms are replaced by activity category $\times$ alone status interaction terms. This regression indicates that, even within activity categories (e.g., comparing home production activities that are performed alone or with others), aloneness is associated with lower emotional well-being.

Evaluative Well-Being Measures

In a second set of questions, survey respondents were asked about their overall life evaluation, using a question called the "Cantril ladder" (Cantril, 1965). Specifically, respondents were asked:

> *Please imagine a ladder with steps numbered from zero at the bottom to ten at the top. The top of the ladder represents the best possible life for you and the bottom of the ladder represents the worst possible life for you. If the top step is 10 and the bottom step is 0, on which step of the ladder do you feel you personally stand at the present time?*

[15] This regression builds on Vagni (2021). He applies the 2014 to 2015 United Kingdom Time Use Surveys to examine the relationship between reported enjoyment (akin to happiness in the ATUS) among parents and the amount of time they spend with one another and with their children. Consistent with the findings in Table 6, Vagni (2021) finds that parents' reported enjoyment is higher in activities with their spouse and with their children.

[16] Survey respondents report lower emotional well-being if the activity takes place early in the morning or in the evening and higher emotional well-being for activities taking place in the middle of the day. Furthermore, long-duration activities have lower reported emotional well-being. For this reason, I include as controls the logarithm of the number of minutes the activity took as well as four-hour categorical variables for when the activity started: midnight-4 A.M.; 4 A.M.-8 A.M.; 8 A.M.-noon; noon-4 P.M.; 4 P.M.-8 P.M.; or 8 P.M. to midnight. The coefficient estimates listed in Table 6 are similar in specifications in which these controls are omitted.

The two measures not only are conceptually distinct — one asks respondents for an overall evaluation of their lives, while the other characterizes emotions during recent activities — but they also differ in their relationships with individuals' life circumstances. For example, Deaton and Kahneman (2010) report that while the relationship between log(income) and emotional well-being plateaus at higher income levels, life evaluation (as measured by the Cantril ladder) is increasing throughout the income distribution. Another contrast is that while unemployed individuals report lower life evaluation, there is no relationship between emotional well-being and unemployment (Knabe et al., 2010).

5.2 Implications of Time Alone for Well-Being Inequality

Having discussed these measures of subjective well-being, I evaluate how they vary with the fraction of time the individual spends alone. First, I use c_{it} to refer to the Cantril ladder score of individual i in year t. Second, following Kahneman et al. (2006), Krueger and Schkade (2008), and Stone et al. (2018), for each individual i in year t, I compute u_{it} as the duration-weighted value of the "U-index" described in the previous subsection. In computing this average, I include both work and non-work activities, though the main results would be similar only computing the U-index based on non-work activities. I "standardize" each of the two well-being measures, subtracting the sample mean from each variable, then dividing by the sample standard deviation. For this section, I use $\dot{u}_{it}$ and $\dot{c}_{it}$ to refer to the standardized versions of u_{it} and c_{it}, respectively.

For respondents to the 2012 and 2013 well-being modules, I compare $\dot{c}_{it}$ and $\dot{u}_{it}$ to the fraction of the respondent's eligible time that is spent alone, $x_{a,it}$; see the top panel of Figure 6.[17] This figure illustrates that a greater share of time alone corresponds to lower subjective well-being. According to this figure, a 5 p.p. increase in alone time — roughly the differential in 2003 to 2019 growth in alone time for high-school-or-less relative to college-educated individuals — corresponds to a 0.016 standard deviation decrease in the Cantril ladder score and a 0.016 standard deviation increase in the U-index.[18]

[17] The life evaluation measure, c_{it}, was not recorded in the 2010 ATUS. To maintain comparability, I do not compute u_{it} for observations from $t = 2010$.

[18] The Cantril ladder and U-index variables may systematically vary with individuals' age, employment status, and other characteristics. To assess whether the conclusions of this section instead reflect the relationships among alone shares, income, and these alternate measures, I first (separately) regress c_{it}, u_{it}, and $x_{a,it}$ against the demographic controls employed in Figure 1, then compute the residual from each of these regressions. Call $\widetilde{c}_{it}$, $\widetilde{u}$, and $\widetilde{x}_{a,it}$ the residuals from these regressions. Finally, to place the subjective well-being measures on a common scale, I divide $\widetilde{c}_{it}$ by its sample standard deviation, and call the resulting variable $\widehat{c}_{it}$. Also let $\widehat{u}_{it}$ refer to $\widetilde{u}_{it}$ divided by its standard deviation. The relationships among c_{it}, u_{it}, and $x_{a,it}$ (when using the above two-step procedure) are similar to those presented in Figure 6. See Appendix Figure C.1. Furthermore, the ATUS well-being module contains two measures of the respondent's health: whether the respondent took pain medication on the previous survey day, and whether the respondent had high blood pressure in the last five years. The relationships within Figure 6 are robust to the inclusion of

Are these differences large or small? I use households' log income (call this y_{it}) as a rough benchmark.[19] In particular, I seek the household income level that has the same predicted change in c_{it} and u_{it} as the 5 p.p. difference in $x_{a,it}$. According to the bottom panel of Figure 6, a regression of $\dot{c}_{it}$ on y_{it} would yield a slope of approximately 0.15. As a result, our 5 p.p. differential in alone time has the same association with life evaluation (measured by c_{it}) as a 10 log point difference in household incomes; for the median household, this 10 log point difference would correspond to approximately \$4,700.[20] A similar calculation, using $\dot{u}_{it}$ instead of $\dot{c}_{it}$, would indicate that a 5 p.p. differential in alone time corresponds to a 20 log point difference in household income, approximately \$8,800 for the median household. So, the relative increase in alone time among less educated, non-White, lower-household-income individuals indicates that subjective well-being inequality may be increasing more rapidly than conventional measures suggest.

Of course, these numbers should be treated with a great deal of caution and modesty. The relationships between income, alone time, and subjective well-being presented in Figure 6 are not based on any experimental or quasi-experimental variation. Moreover, individuals' overall life evaluation likely depends on their time alone in the long run, not at a moment in time. Since the ATUS is collected from a single day, measures of time alone from these data provide a noisy proxy for this longer-run concept. As a result of this classical measurement error, the estimated (life-evaluation-based) well-being inequality implications of increased time alone are downward biased.[21] Finally, as discussed at the beginning of the section, the interpretation of subjective well-being measures is contentious. Acknowledging these limitations, the goal of this section is modest: I wish simply to suggest that existing analyses ignoring who individuals spend their time with may not fully capture increasing trends in inequality. To make this point, identification based on quasi-experimental variation is not crucial. Furthermore, in response to the concerns identified by Bond and Lang (2019) and Bloem (2021), I confirm that the relationships given in Figure 6 are robust to various transformations and alternate variable definitions in Appendix Figure C.2.[22]

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these variables as additional controls.

[19]The ATUS reports household income in 16 intervals. I drop the lowest interval (\$0 to \$4,999) and highest interval (greater than \$150,000) when producing Figure 6. For the other 14 intervals, I set the income as the midpoint within each interval.

[20]To arrive at the first number, divide 0.016 (the standard deviations of $\dot{c}_{it}$ corresponding to a 5 p.p. alone time differential) by 0.15 (the slope of the relationship between $\dot{c}_{it}$ and household income). To arrive at the second number, multiply $\frac{0.016}{0.15}$ by the median household income in the sample, \$45,000.

[21]Frazis and Stewart (2012) are the first to make this argument in the context of measures based on the ATUS.

[22]Consistent with this robustness check, Kaiser and Vendrik (2023) argue that the concerns raised by Bond and Lang (2019) apply only in rare circumstances; see also Nikolova and Graham (2021). I consider two additional sensitivity analyses in Appendix C: First, when applying the explanatory variables employed in Figure 6 and a linear probability model, there is no conditional correlation between the two measures of

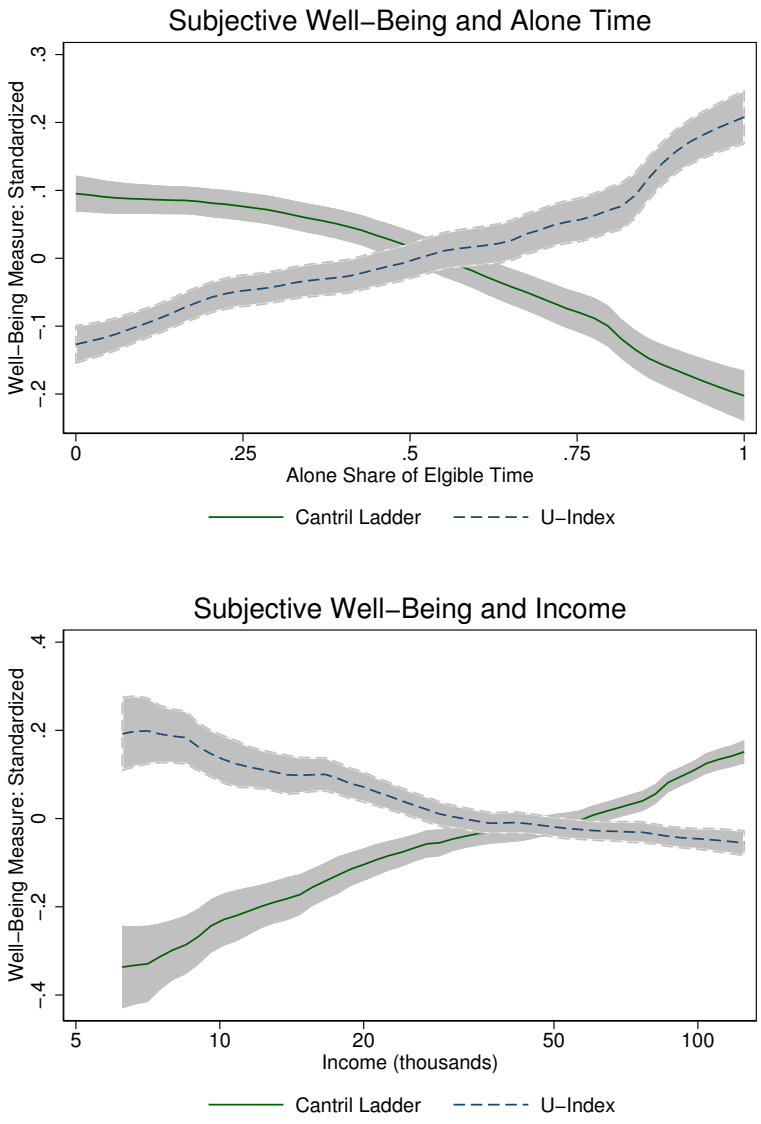

Figure 6: Relationship between Well-Being, Household Income, and Alone Time

Notes: The top panel relates well-being measures to the individual's share of eligible time that is spent alone. The well-being measures on the vertical axis are standardized. That is, for each measure, I first subtract the sample mean and then divide by the sample standard deviation. The sample in the top panel includes the 20,766 respondents to the well-being module with a non-missing Cantril ladder score and a non-missing U-index. In the bottom panel, I replace "Alone Share of Eligible Time" with log household income on the horizontal axis. The sample in the bottom panel includes the 18,606 individuals that have non-missing Cantril ladder and U-index measures and also have non-missing log household income data.

6 Conclusion

Americans increasingly spend their free time alone. This shift is concentrated in leisure activities — with time alone and at home replacing time outside of the house and with people from other households — among individuals with less education and with lower household income, as well as among those who are younger, male, and non-White. Finally, given that time alone is associated with lower subjective well-being, increases in solitude among lower-income households suggest that conventional income measures may be understating the extent to which welfare inequality has been increasing over the last two decades.

These findings prompt four interrelated sets of questions for future research. First, while time alone was increasing before 2020, the COVID-19 pandemic resulted in an appreciable increase in aloneness. As the pandemic has abated, time spent with others outside of one's household has rebounded, but levels remain below their pre-pandemic values. It is an open question as to whether the pandemic will leave a permanent impact on how, where, and with whom Americans spend their free time.

Second, time allocation across activities differs markedly — in overall levels, in country-wide trends, and in within-country dispersion (Gimenez-Nadal and Sevilla, 2012). But are there analogous cross-country differences in the growth and dispersion in whom people spend their time with? In particular, is increasing social isolation among lower-income, less-educated households a uniquely American phenomenon?

Third, what are the implications of the changing nature of social interactions — away from in-person, face-to-face interactions towards interactions mediated by digital platforms — on individuals' well-being? Initial evidence from ATUS diaries suggests that, on average, subjective well-being is relatively low when social interactions take place online (see footnote 12). Moreover, in the extant literature, Twenge et al. (2018) link increased adolescent screen time in the early 2010s to higher rates of depression and suicide (see also Andreassen et al., 2016). Others, including Halbrook et al. (2019), write that researchers' prognosis of video games has been predominantly and overly negative, and they highlight the pro-social and psychologically beneficial possibilities of playing video games with others. More broadly, at least for certain groups of individuals, the availability of online social interactions provides new opportunities for social participation (Duplaga and Szulc, 2019; Sen et al., 2022). In sum, while there is not a consensus on the subject, it is likely that for most people, video games

physical health and the fraction of eligible time spent alone; see Table C.5. So, the importance of time alone as a predictor of well-being is not merely a reflection of the well-known relationship between physical health and subjective well-being. Second, in the same appendix, I show that the relationship between time that individuals spend alone is positively related to the duration-weighted stated sadness, stress, and pain that the individual reports and negatively related to the duration-weighted meaning that the individual reports. See Appendix Figure C.3.

and online social media provide, at best, an imperfect substitute for in-person interactions. Future research will hopefully provide more concrete insights on how best to exploit the new opportunities afforded by digital communication technologies without displacing the uniquely beneficial aspects of in-person interaction.

Finally, policymakers have become increasingly attuned to the risks associated with social isolation. In May 2023, for instance, the U.S. Surgeon General issued an advisory report on *Our Epidemic of Loneliness and Isolation.*[23] Policymakers have offered policies aimed at reducing the prevalence of social isolation and mitigating its harmful impacts. These policies include promoting volunteer organizations and other civic groups; investing in physical spaces in which people can gather; incorporating the development of social skills and social connections in educational curricula; and incentivizing health care providers to monitor social isolation among their patients. Research evaluations on the relative efficacy of these programs would be an invaluable resource in future efforts to reconnect Americans to one another.

[23]See `https://www.hhs.gov/sites/default/files/surgeon-general-social-connection-advisory.pdf` ; accessed August 8, 2023.

References

Aguiar, M., Bils, M., Charles, K., and Hurst, E. (2021). Leisure Luxuries and the Labor Supply of Young Men. *Journal of Political Economy*, 129(2):337–382.

Aguiar, M. and Hurst, E. (2007). Measuring Trends in Leisure: The Allocation of Time over Five Decades. *Quarterly Journal of Economics*, 122(3):969–1006.

Aguiar, M. and Hurst, E. (2016). The Macroeconomics of Time Allocation. *Handbook of Macroeconomics*, 2:203–253.

Anderson, M. L. (2008). Multiple Inference and Gender Differences in the Effects of Early Intervention: A Reevaluation of the Abecedarian, Perry Preschool, and Early Training Projects. *Journal of the American Statistical Association*, 103(484):1481–1495.

Andreassen, C. S., Billieux, J., Griffiths, M. D., Kuss, D. J., Demetrovics, Z., Mazzoni, E., and Pallesen, S. (2016). The Relationship between Addictive Use of Social Media and Video Games and Symptoms of Psychiatric Disorders: A Large-Scale Cross-Sectional Study. *Psychology of Addictive Behaviors*, 30(2):252–262.

Anttila, T., Selander, K., and Oinas, T. (2020). Disconnected Lives: Trends in Time Spent Alone in Finland. *Social Indicators Research*, 150(2):711–730.

Appau, S., Churchill, S. A., and Farrell, L. (2019). Social Integration and Subjective Well-being. *Applied Economics*, 51(1):1748–1761.

Autor, D., Dorn, D., and Hanson, D. (2019). When Work Disappears: Manufacturing Decline and the Falling Marriage Market Value of Young Men. *American Economic Review: Insights*, 1(2):161–178.

Becker, G. S. (1965). A Theory of the Allocation of Time. *Economic Journal*, 75:493–517.

Becker, G. S. and Rayo, L. (2008). Economic Growth and Subjective Well-Being: Re-Assessing the Easterlin Paradox: Comment. *Brookings Papers on Economic Activity*, 2008(1):88–95.

Benjamini, Y. and Hochberg, Y. (1995). Controlling the False Discovery Rate: A Practical Approach to Multiple Hypothesis Testing. *Journal of the Royal Statistical Society: Series B*, 57(1):289–300.

Bittman, M. and Wajcman, J. (2000). The Rush Hour: The Character of Leisure Time and Gender Equity. *Social Forces*, 79(1):165–189.

Bloem, J. R. (2021). How Much Does the Cardinal Treatment of Ordinal Variables Matter? An Empirical Investigation. *Political Analysis*, pages 1–17.

Boerma, J. and Karabarbounis, L. (2021). Inferring Inequality with Home Production. *Econometrica*, 89(5):2517–2556.

Bond, T. N. and Lang, K. (2019). The Sad Truth about Happiness Scales. *Journal of Political Economy*, 127(4):1629–1640.

Burlina, C. and Rodríguez-Pose, A. (2021). Alone and Lonely: The Economic Cost of Solitude for Regions in Europe. Technical report.

Cantril, H. (1965). *Pattern of Human Concerns*. Rutgers University Press.

Case, A. and Deaton, A. (2015). Rising Morbidity and Mortality in Midlife Among White Non-Hispanic Americans in the 21st Century. *Proceedings of the National Academy of Sciences*, 112(49):15078–15083.

Case, A. and Deaton, A. (2017). Mortality and Morbidity in the 21st Century. *Brookings Papers on Economic Activity*, 2017(2):397–443.

Case, A. and Deaton, A. (2020). *Deaths of Despair and the Future of Capitalism*. Princeton University Press.

Case, A. and Deaton, A. (2022). The Great Divide: Education, Despair, and Death. *Annual Review of Economics*, 14:1–12.

Chetty, R., Jackson, M. O., Kuchler, T., Stroebel, J., Hendren, N., Fluegge, R. B., Gong, S., Gonzalez, F., Grondin, A., Jacob, M., Johnston, D., Koenen, M., Laguna-Muggenburg, E., Mudekereza, F., Rutter, T., Thor, N., Townsend, W., Ruby, Zhang, Bailey, M., Barbera, P., Bhole, M., and Wernerfelt, N. (2022). Social Capital I: Measurement and Associations with Economic Mobility. *Nature*, 608(7921):108–121.

Clark, A. K. (2015). Rethinking the Decline in Social Capital. *American Politics Research*, 43(4):569–601.

Deaton, A. and Kahneman, D. (2010). High Income Improves Evaluation of Life but Not Emotional Well-Being. *Proceedings of the National Academy of Sciences*, 107(38):16489–16493.

Deming, D. J. (2017). The Growing Importance of Social Skills in the Labor Market. *Quarterly Journal of Economics*, 132(4):1593–1964.

Diener, E. and Seligmann, M. E. P. (2002). Very Happy People. *Psychological Science*, 13(1):81–84.

Doepke, M. and Tertilt, M. (2016). Families in Macroeconomics. *Handbook of Macroeconomics*, 2:1789–1891.

Drotning, K. (2020). Time Spent Alone in the United States by Gender and Race-Ethnicity. Technical report.

Duplaga, M. and Szulc, K. (2019). The Association of Internet Use with Wellbeing, Mental Health and Health Behaviours of Persons with Disabilities. *International Journal of Environmental Research and Public Health*, 16(18):3252.

Egerton, M., Fisher, K., and Gershuny (2005). American Time Use 1965-2003: The Construction of a Historical Comparative File, and Consideration of its Usefulness in the Construction of Extended National Accounts for the USA. Technical report.

Elliott, D. B. and Dye, J. L. (2005). Unmarried-Partner Households in the United States: Description and Trends 2000 to 2003. Technical report.

Fischer, C. S. (2009). The 2004 GSS Finding of Shrunken Social Networks: An Artifact? *American Sociological Review*, 74(4):657–669.

Fisher, K., Gershuny, J., Flood, S. M., Roman, J. G., and Hofferth, S. L. (2018). American Heritage Time Use Study Data Extract System: Version 1.2 [dataset]. Minneapolis, MN: IPUMS, 2018. https://doi.org/10.18128/D061.V1.2.

Frazis, H. (2022). Sources of Increases in Time Alone during the COVID Pandemic: Evidence from the American Time Use Survey. Technical report.

Frazis, H. and Stewart, J. (2012). How to Think about Time-Use Data: What Inferences Can We Make about Long- and Short-Run Time Use from Time Diaries. *Annals of Economics and Statistics*, (105/106):231–245.

Ghez, G. R. and Becker, G. S. (1975). *The Allocation of Time and Goods over the Life Cycle*. National Bureau of Economic Research.

Gimenez-Nadal, J. I. and Sevilla, A. (2012). Trends in Time Allocation: A Cross-Country Analysis. *European Economic Review*, 56(6):1338–1359.

Granovetter, M. S. (1973). The Strength of Weak Ties. *American Journal of Sociology*, 78(6):1360–1380.

Halbrook, Y. J., O'Donnell, A. T., and Msetfi, R. M. (2019). When and How Video Games Can Be Good: A Review of the Positive Effects of Video Games on Well-Being. *Perspectives on Psychological Science*, (6):1096–1104.

Hall, J. A. (2019). How Many Hours Does It Take to Make a Friend? *Journal of Social and Personal Relationships*, 36(4):1278–1296.

Hamermesh, D. (2020). Life Satisfaction, Loneliness and Togetherness, with an Application to Covid-19 Lock-Downs. *Review of Economics of the Household*, 18:983–1000.

Hofferth, S. L., Flood, S. M., Sobek, M., and Backman, D. (2020). American Time Use Survey Data Extract Builder: Version 2.8 [dataset] College Park, MD: University of Maryland and Minneapolis, MN: IPUMS, 2020. https://doi.org/10.18128/D060.V2.8.

Holt-Lunstad, J., Smith, T. B., Baker, M., Harris, T., and Stephenson, D. (2015). Loneliness and Social Isolation as Risk Factors for Mortality: A Meta-Analytic Review. *Perspectives on Psychological Science*, 10(2):227–237.

Jackson, M. O., Rogers, B. W., and Zenou, Y. (2017). The Economic Consequences of Social-Network Structure. *Journal of Economic Literature*, 55(1):49–95.

Kahneman, D., Krueger, A. B., Schkade, D., Schwarz, N., and Stone, A. (2004). A Survey Method for Characterizing Daily Life Experience: The Day Reconstruction Method. *Science*, 306:1776–1780.

Kahneman, D., Krueger, A. B., Schkade, D., Schwarz, N., and Stone, A. (2006). Would You Be Happier If You Were Richer? A Focusing Illusion. *Science*, 312:1908–1910.

Kahneman, D. and Thaler, R. H. (2006). Anomalies: Utility Maximization and Experienced Utility. *Journal of Economic Perspectives*, 20(1):221–234.

Kaiser, C. and Vendrik, M. (2023). How Much Can We Learn from Happiness Data? Technical report.

Kimbrough, G. (2019). Xboxes and Ex-Workers? Gaming and Labor Supply of Young Adults in the U.S. Technical report.

Klinenberg, E. (2013). *Going Solo: The Extraordinary Rise and Surprising Appeal of Living Alone*. Penguin.

Knabe, A., Rätzel, S., Schöb, R., and Weimann, J. (2010). Dissatisfied with Life but Having a Good Day: Time-use and Well-being of the Unemployed. *Economic Journal*, 120(547):867–889.

Krueger, A. B. and Schkade, D. A. (2008). The Reliability of Subjective Well-Being Measures. *Journal of Public Economics*, 92(8-9):1833–1845.

Kunze, L. and Suppa, N. (2017). Bowling Alone or Bowling at All? The Effect of Unemployment on Social Participation. *Journal of Economic Behavior and Organization*, 133:213–235.

Long, C. R. and Averilli, J. R. (2003). Solitude: An Exploration of the Benefits of Being Alone. *Journal for the Theory of Social Behavior*, 33(1):21–44.

MacKerron, G. (2012). Happiness Economics from 35,000 Feet. *Journal of Economic Surveys*, 26(4):705–735.

McPherson, M., Smith-Lovin, L., and Brashears, M. (2006). Social Isolation in America: Changes in Core Discussion Networks over Two Decades. *American Sociological Review*, 71(3):353–375.

Nikolova, M. and Graham, C. (2021). The Economics of Happiness. In *Handbook of Labor, Human Resources and Population Economics*, pages 1–33. Springer.

Putnam, R. D. (1995). Bowling Alone: America's Declining Social Capital. *Journal of Democracy*, 6:65–78.

Putnam, R. D. (2000). *Bowling Alone: The Collapse and Revival of American Community*. Simon & Schuster.

Roberts, S. G. B. and Dunbar, R. I. M. (2011). The Costs of Family and Friends: An 18-Month Longitudinal Study of Relationship Maintenance and Decay. *Evolution and Human Behavior*, 32(3):186–197.

Sen, K., Prybutok, G., and Prybutok, V. (2022). The Use of Digital Technology for Social Wellbeing Reduces Social Osolation in Older Adults: A Systematic Review. *SSM - Population Health*, 17:101020.

Sevilla, A., Gimenez-Nadal, J. I., and Gershuny, J. (2012). Leisure Inequality in the United States: 1965-2003. *Demography*, (3):939–964.

Stevenson, B. and Wolfers, J. (2008). Economic Growth and Subjective Well-Being: Reassessing the Easterlin Paradox. *Brookings Papers on Economic Activity*, 2008(1):1–87.

Stone, A. A. and Mackie, C. E. (2013). *Subjective Well-Being: Measuring Happiness, Suffering, and Other Dimensions of Experience*. National Academy Press.

Stone, A. A., Schneider, S., Krueger, A., Schwartz, J. E., and Deaton, A. (2018). Experiential Wellbeing Data from the American Time Use Survey: Comparisons with Other Methods and Analytic Illustrations with Age and Income. *Social Indicators Research*, 136(1):359–378.

Thoits, P. A. (2011). Mechanisms Linking Social Ties and Support to Physical and Mental Health. *Journal of Health and Social Behavior*, 52(2):145–161.

Twenge, J. M., Joiner, T. E., Rogers, M. L., and Martin, G. N. (2018). Increases in Depressive Symptoms, Suicide-Related Outcomes, and Suicide Rates Among U.S. Adolescents After 2010 and Links to Increased New Media Screen Time. *Clinical Psychological Science*, 6(1):3–17.

Twenge, J. M. and Spitzberg, B. H. (2020). Declines in Non-Digital Social Interaction Among Americans: 2003-2017. *Journal of Applied Social Psychology*, 50(6):363–367.

Twenge, J. M., Spitzberg, B. H., and Campbell, W. K. (2019). Less In-Person Social Interaction with Peers Among U.S. Adolescents in the 21st Century and Links to Loneliness. *Journal of Social and Personal Relationships*, 36(6):1892–1913.

Umberson, D. and Karas Montez, J. (2010). Social Relationships and Health: A Flashpoint for Health Policy. *Journal of Health and Social Behavior*, 51:S54–S66.

Vagni, G. (2021). From Me to You: Time Together and Subjective Well-Being in the UK. *Sociology*, 56(2):262–279.

A Additional Details on Activity Category Definitions

Throughout the analysis, I refer to eligible activities as activities outside of work for which the survey respondent is asked who they were with. For the purpose of this definition, "work" refers to activities with codes beginning with an ATUS activity code beginning with "0501".[24] I further break out eligible activities into six non-overlapping groups:

- *childcare* refers to activities beginning with "0301," "0302," or "0303," or activities between "180301" and "1810304;"
- *eating* refers to the activities "110101," "181101," "110201," "110299," or "119999;"
- *home production* refers to activities beginning with "0201," "0202," "0203," "0204," "0205," "0207," "1802," or the activity "020902;"
- *leisure at home* refers to the following activities taking place at the survey respondent's own home: activities beginning with "1201," "1202," "1203," "1204," "1205," "1209," "1301," "1302," "1401," "1409," and "1819;"
- *leisure outside of the home* refers to the same set of activities from the previous bullet point when they take place outside of one's own home;
- *other eligible time* refers to all other activities.

Further, in Appendix B, I group activities based on the relationship between the survey respondent and the identity of the person with whom each activity is conducted. In this appendix, I describe types of relationships:

- a *spouse or partner* refers to a "Spouse" or an "Unmarried Partner";
- a *child* refers to an "Own Household Child", a "Grandchild", a "Foster Relationship Child", or an "Own Non-Household Child";
- an *other relation* refers to a "Parent" (living in the household), a "Brother or Sister", an "Other Related Person", or a "Parent" (living outside of the household);
- a *friend* refers to a "Housemate or Roommate", a "Roomer or Boarder", an "Other Non-related Person" (living in the same household), "Friends", or "Co-workers, colleagues, clients" (non-work activities only); and

[24] For the ATUS activity codes, see `https://usa.ipums.org/usa-action/variables/ACTIVITY`; accessed October 31, 2023.

- *all other individuals* refers to "Neighbors and Acquaintances," "Other Non-household children under 18", "Other non-household adults over 18", "Boss or manager" (at work), "People whom I supervise" (at work), "Co-workers" (at work), and "Customers" (at work).

B Analysis Supplementing Section 4

This appendix compiles additional figures and tables supplementing those in Section 4. I first present trends in time alone within 2020, 2021, and 2022. I then estimate linear time trends in demographic groups' time alone and with others. I close by plotting 2003 to 2022 trends in time with one's spouse or partner, with one's children, with other relatives, and with friends.

Time Alone in 2020, 2021, and 2022

First, Table B.1 presents the share of eligible time spent alone for each quarter within 2020, 2021, and 2022, relative to the same quarter in the pre-pandemic period (averaging between 2017, 2018, and 2019).[25] (The COVID-19 pandemic interrupted data collection for nearly two months, between March 18, 2020 and May 9, 2020. Given that mobility was severely restricted during this two-month period, it is possible that alone time was greater during the first two quarters of 2020 than what is reported in Table B.1) Overall, data from 2020, 2021, and 2022 suggest that alone time increased by approximately 2 to 3 p.p., with peak aloneness during 2020Q3 to 20201Q1, greater increases for lower- and middle-education individuals, and (especially in 2021 and 2022) younger individuals. However, there is meaningful statistical variability from quarter to quarter, clouding some of these comparisons.

Estimating Linear Trends in Time Alone

In Section 4, I estimate a regression in which demographic groups' time spent alone or with others varies flexibly over the course of the sample. For each demographic group, I estimate a separate year effect for each year in the sample. The advantage of this procedure is that it can identify any non-linearities or breaks within trends in time allocation decisions. In this section, I consider a more parsimonious specification, in which time alone or with others still

[25] Throughout 2003 to 2022, there is some seasonality in the alone share, which increases each October and November by approximately 1-2 p.p. compared to December and January. Comparing time alone to the analogous quarter from 2017 to 2019 attempts to account for this seasonality.

Table B.1: Time Alone: 2020, 2021, and 2022, Relative to 2017-2019

	2020				2021				2022			
Demographic Group	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
Entire Sample	0.017	0.017	0.038	0.049	0.039	0.033	0.034	0.016	0.018	0.029	0.035	0.009
≤High School	0.021	0.051	0.050	0.074	0.041	0.052	0.037	0.009	0.031	0.020	0.054	0.027
Some College	0.011	0.026	0.039	0.052	0.071	0.043	0.062	0.022	0.011	0.066	0.012	0.008
≥College	0.020	-0.018	0.026	0.023	0.019	0.011	0.014	0.021	0.012	0.018	0.031	-0.003
Age≤39	0.028	-0.005	0.044	0.051	0.073	0.023	0.060	0.043	0.028	0.080	0.046	0.040
Age∈[40,59]	-0.002	0.012	0.021	0.031	0.004	0.028	0.010	-0.010	-0.013	-0.015	0.032	-0.042
Age≥60	0.024	0.043	0.045	0.062	0.029	0.044	0.025	0.004	0.033	0.005	0.018	0.021
Low HH Incom5e	0.027	0.049	0.060	0.052	0.044	0.059	0.049	-0.011	0.041	0.050	0.057	-0.026
Medium HH Income	0.019	0.014	0.037	0.065	0.064	0.027	0.030	0.038	0.007	0.022	0.030	0.017
High HH Income	0.017	-0.010	0.030	0.036	0.016	0.016	0.029	0.034	-0.008	-0.013	0.023	0.042

Notes: The numbers within this table list the share of eligible time that is spent alone, relative to the same quarter in 2017 to 2019.

varies by demographic groups, but where any differences in trends are assumed to be linear. I estimate the following three regressions:

$$x_{a,it} = \gamma_0 + \gamma_a \cdot t + \sum_{g \in \mathcal{G}, g \neq g^r} \left(\gamma_{a,g(i)} \cdot t + \theta'_{a,g(i)} \mathbf{X_{i,t}} \right) + \varepsilon_{a,it} \ , \tag{8}$$

$$x_{s,it} = \gamma_0 + \gamma_s \cdot t + \sum_{g \in \mathcal{G}, g \neq g^r} \left(\gamma_{s,g(i)} \cdot t + \theta'_{s,g(i)} \mathbf{X_{i,t}} \right) + \varepsilon_{s,it} \ , \text{ and} \tag{9}$$

$$x_{o,it} = \gamma_0 + \gamma_o \cdot t + \sum_{g \in \mathcal{G}, g \neq g^r} \left(\gamma_{o,g(i)} \cdot t + \theta'_{o,g(i)} \mathbf{X_{i,t}} \right) + \varepsilon_{o,it} \ . \tag{10}$$

In Equation 8, I compare trends in share of eligible time that is spent alone across demographic groups; the γ_a capture overall trends for a particular reference group, while the $\gamma_{a,g(i)}$ terms capture the relative trend in alone time for group g relative to this reference group. Columns (1) and (2) of Table B.2 present estimates of $\gamma_{a,g(i)}$. The first two columns indicate that alone time was growing by 0.2 p.p. per year faster for individuals with high school education or less relative to the reference group (people with a 4-year college degree.) Given the 20-year sample period, this overall change is comparable to that reported in Table B.2: $-0.0023 \cdot 19 \approx -0.044$, which is close to the -0.034 presented in column (4) of Panel A of Table 2. Further, also consistent with the results in Table 2, alone time was increasing more for individuals in low-income and moderate-income households (relative to those from high-income households), non-Whites and Hispanic Whites (relative to Hispanic Whites), the young and old (relative to the middle aged), and males (relative to females.)

Columns (3) and (4) present estimates of trends in time spent with people from the same household as the survey respondent, while columns (5) and (6) present corresponding estimates for time spent with people from other households. Declines in time spent on both types of interactions were more severe for individuals with less education and for the young. In addition, time spent with people from other households declined more for non-White (relative to White) individuals and for males (relative to females). These conclusions are, for the most part, consistent with those collected in Tables 3 and 4.

Time Spent with Spouses, Children, Friends, and Other Relatives

In Figures B.1 and B.2, I consider heterogeneity — by education and by race and ethnicity — in time spent with spouses, children, friends, and other relatives. These figures build on Figure 3 in Section 4, which showed that time spent with individuals from other households declined markedly between 2003 and 2022, while time spent with individuals from the same household was relatively flat. Individuals from other households include friends, parents and siblings, co-workers, and other acquaintances. Figures B.1 and B.2 demonstrate that

Table B.2: Estimates of Equations 8, 9, and 10

	(1) $\gamma_{a,g(i)}$	(2) $\gamma_{a,g(i)}$	(3) $\gamma_{s,g(i)}$	(4) $\gamma_{s,g(i)}$	(5) $\gamma_{o,g(i)}$	(6) $\gamma_{o,g(i)}$
Panel A: Education						
	0.0023***	0.0016***	-0.0016***	-0.0002	-0.0007**	-0.0014***
High School or Less	(0.0003)	(0.0004)	(0.0004)	(0.0005)	(0.0003)	(0.0004)
	[0.001]	[0.001]	[0.001]	[0.646]	[0.027]	[0.001]
	0.0022***	0.0017***	-0.0014***	-0.0006	-0.0006*	-0.0010**
Some College	(0.0004)	(0.0005)	(0.0004)	(0.0005)	(0.0003)	(0.0004)
	[0.001]	[0.002]	[0.001]	[0.409]	[0.079]	[0.029]
Panel B: Household Income						
	0.0018***	0.0013***	-0.0012***	-0.0004	-0.0001	-0.0006
Low Income	(0.0004)	(0.0005)	(0.0004)	(0.0005)	(0.0003)	(0.0004)
	[0.001]	[0.001]	[0.006]	[0.474]	[0.810]	[0.283]
	0.0014***	0.0013**	-0.0010**	-0.0008	-0.0002	-0.0005
Medium Income	(0.0004)	(0.0005)	(0.0004)	(0.0005)	(0.0003)	(0.0004)
	[0.001]	[0.011]	[0.026]	[0.321]	[0.745]	[0.367]
Panel C: Race and Ethnicity						
	0.0014***	0.0014**	-0.0000	-0.0005	-0.0013***	-0.0010**
Non-White	(0.0004)	(0.0005)	(0.0004)	(0.0005)	(0.0003)	(0.0004)
	[0.002]	[0.010]	[0.924]	[0.459]	[0.001]	[0.029]
	0.0019***	0.0012*	-0.0014**	-0.0010	0.0000	0.0002
Hispanic Whites	(0.0005)	(0.0006)	(0.0006)	(0.0006)	(0.0004)	(0.0005)
	[0.001]	[0.052]	[0.010]	[0.321]	[0.990]	[0.730]
Panel D: Age Group						
	0.0036***	0.0025***	-0.0015***	-0.0008	-0.0025***	-0.0018***
Age: 18-39	(0.0004)	(0.0004)	(0.0004)	(0.0005)	(0.0003)	(0.0004)
	[0.001]	[0.001]	[0.001]	[0.321]	[0.001]	[0.001]
	0.0014***	0.0012**	-0.0015***	-0.0014**	0.0002	0.0003
Age: 60-85	(0.0003)	(0.0004)	(0.0004)	(0.0004)	(0.0002)	(0.0003)
	[0.001]	[0.010]	[0.001]	[0.016]	[0.680]	[0.392]
Panel E: Sex						
	0.0011***	0.0011**	0.0002	0.0003	-0.0008***	-0.0008**
Male	(0.0003)	(0.0004)	(0.0003)	(0.0004)	(0.0002)	(0.0003)
	[0.001]	[0.010]	[0.516]	[0.474]	[0.004]	[0.029]
Sample	2003-2022	2003-2019	2003-2022	2003-2019	2003-2022	2003-2019

Notes: Within each panel and each column, I present estimates of $\gamma_{a,g(i)}$ (in columns 1-2), $\gamma_{s,g(i)}$ (columns 3-4), or $\gamma_{o,g(i)}$ (columns 5-6). These coefficients present estimates of the differential trend — relative to the reference group — in time spent alone, with individuals from the same household, or with individuals from other households. In addition to these variables and an overall estimated time trend, the regression includes all of the controls listed in Figure 1 (with coefficients allowed to vary by demographic group). Across the different panels, the base group includes individuals with a 4-year college degree (panel A), individuals from high income households (panel B), non-Hispanic White individuals (panel C), individuals aged 40 to 59 (panel D), and females (panel E). The sample in columns (1), (3), and (5) includes all 227,191 individuals. The sample in columns (2), (4), and (6) includes the 201,834 individuals who were surveyed between 2003 and 2019. Robust standard errors are in parentheses; p-values, correcting for multiple comparisons using the method of Benjamini and Hochberg (1995) and Anderson (2008) are in square brackets. ***: p-value< 0.01; **: p-value$\in [0.01, 0.05)$; *: p-value$\in [0.05, 0.10)$.

time spent with spouses and children (who tend to reside in the same household as the respondent) and time spent with other relatives (who tend to reside in other households) were flat over the sample period. Time spent with friends — specifically, friends or coworkers/clients/colleagues (in non-work activities) — declined considerably. At the beginning of the sample, individuals spent 10.8 percent of their eligible time with friends. This declined by about one-third, by 3.4 p.p., between 2003 and 2019 and then declined even further in 2020 before rebounding in 2021 and 2022.

C Analysis Supplementing Section 5

This appendix compiles additional figures and tables supplementing those in Section 5. I first consider sensitivity analysis related to Table 6. Then, I reproduce Figure C.1 (i) with controls for demographic characteristics, (ii) by applying alternate monotonic transformations to my baseline measures of subjective well-being, and (c) by applying alternate measures of subjective well-being. Finally, I present the relationship between health measures in the well-being module to time spent alone.

Sensitivity Analysis Related to Table 6

Tables C.1, C.2, and C.3 re-estimate the relationship between individuals' stated subjective well-being, the types of activities they pursue, and whether those activities are pursued alone or with others. In Table C.1, I estimate this relationship, weighting observations according to the ATUS sample weights. (In contrast, in Table 6 observations are weighted according to the product of the length of the activity and the ATUS sample weight.) While the relative ranking of activities is the same as in Table 6, the coefficient estimates of leisure outside of the home, leisure inside the home, and childcare are meaningfully smaller. On the other hand, the coefficients characterizing the relationship between subjective well-being and alone status are essentially the same — in magnitude and statistical significance — in Table C.1 as in Table 6.

Second, Table C.2 illustrates how individual negative affect measures vary with the type of activity and whether the activity was pursued alone. The main result from this table is that time alone is primarily associated with greater sadness, stress, and pain, with considerably weaker results for tiredness.

Finally, in Table C.3 I estimate a more comprehensive specification when evaluating the relationship among subjective well-being within an activity, the type of activity involved, and whether the activity took place while the survey respondent was alone. Here, I estimate separate coefficients for the interaction between the type of activity and whether it was

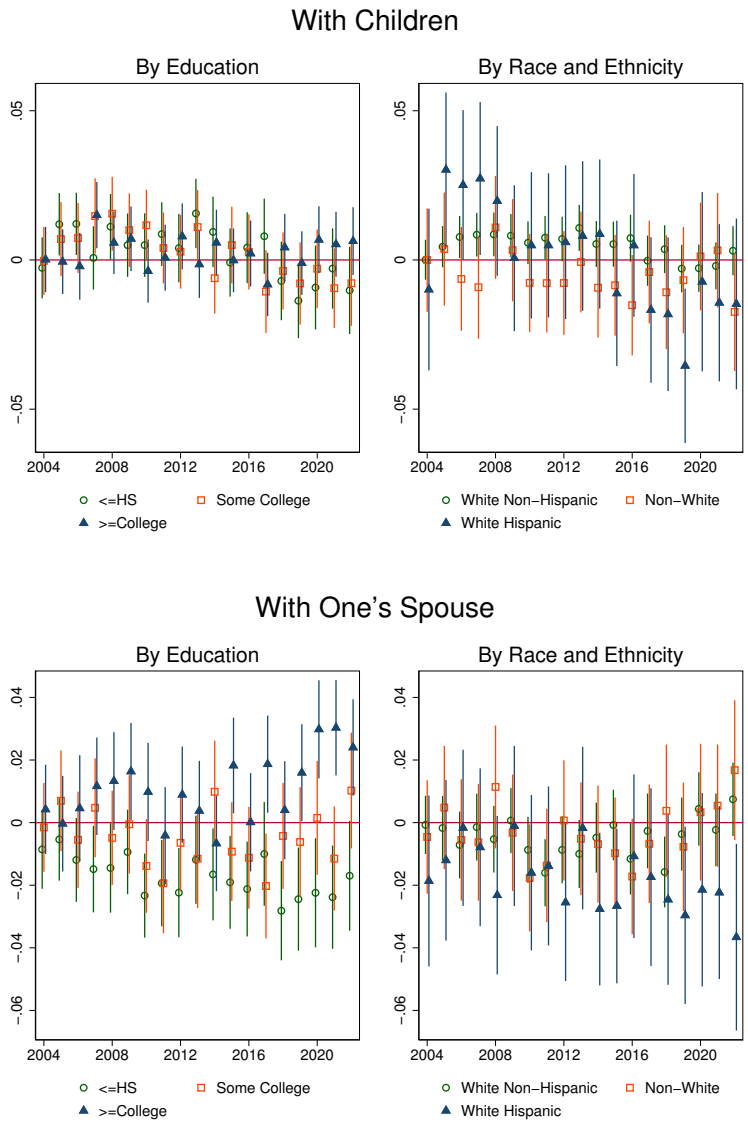

Figure B.1: Trends in Time Spent with Groups of Individuals

Notes: See the notes for Figure 1 for the list of controls and Appendix A for the definition of time spent with children or time spent with spouses/partners. The figure includes 1.96 standard-error confidence intervals computed based on robust standard errors.

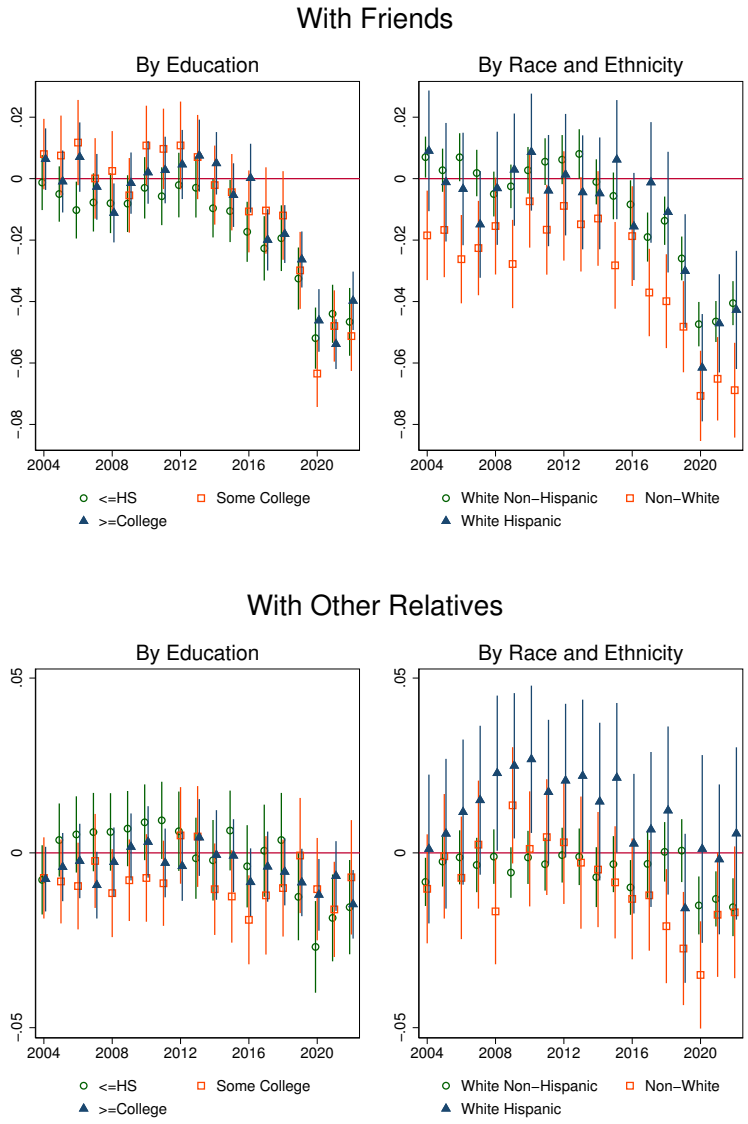

Figure B.2: Trends in Time Spent with Groups of Individuals

Notes: See the notes for Figure 1 for the list of controls and Appendix A for definitions of time spent with friends or time spent with other relatives. The figure includes 1.96 standard-error confidence intervals computed based on robust standard errors.

Table C.1: Emotional Well-Being Measures by Activity Group and Alone Status

Dependent Variable	Net Affect		U-Index		Happiness		Meaning	
Leisure at Home	0.147	0.173	-0.031	-0.020	0.045	0.074	-0.386	-0.366
	(0.035)	(0.029)	(0.006)	(0.007)	(0.024)	(0.023)	(0.030)	(0.030)
Leisure out of Home	0.565	0.309	-0.079	-0.043	0.315	0.206	0.212	0.208
	(0.037)	(0.034)	(0.007)	(0.008)	(0.026)	(0.026)	(0.032)	(0.034)
Eating	0.369	0.310	-0.058	-0.048	0.208	0.192	0.101	0.109
	(0.030)	(0.024)	(0.005)	(0.006)	(0.021)	(0.019)	(0.026)	(0.024)
Home Production	0.014	-0.102	-0.019	-0.001	-0.028	-0.097	0.058	-0.085
	(0.032)	(0.027)	(0.006)	(0.006)	(0.023)	(0.021)	(0.027)	(0.026)
Childcare	0.360	0.364	-0.042	-0.053	0.304	0.316	0.744	0.647
	(0.039)	(0.037)	(0.007)	(0.009)	(0.027)	(0.029)	(0.031)	(0.036)
Alone	-0.524	-0.341	0.063	0.040	-0.428	-0.279	-0.523	-0.489
	(0.022)	(0.022)	(0.004)	(0.005)	(0.015)	(0.017)	(0.019)	(0.022)
Person Fixed Effects	No	Yes	No	Yes	No	Yes	No	Yes
Observations	90,567	89,326	90,567	89,326	90,567	89,326	90,567	89,326
Adjusted R^2	0.027	0.625	0.016	0.402	0.030	0.515	0.046	0.480

Notes: See the notes for Table 6. In contrast to that table, activities are weighted by the sample weight, not by the product of the sample weight and duration.

Table C.2: Emotional Well-Being Measures by Activity Group and Alone Status

	Stress		Pain		Sadness		Tiredness	
Leisure at Home	-0.738	-0.461	0.041	-0.084	-0.047	-0.067	-0.187	0.111
	(0.046)	(0.034)	(0.046)	(0.022)	(0.039)	(0.027)	(0.048)	(0.035)
Leisure out of Home	-0.828	-0.440	-0.316	0.044	-0.223	-0.062	-0.541	-0.139
	(0.050)	(0.034)	(0.048)	(0.025)	(0.041)	(0.030)	(0.062)	(0.042)
Eating	-0.653	-0.385	-0.130	-0.041	-0.187	-0.122	-0.385	-0.101
	(0.037)	(0.030)	(0.035)	(0.021)	(0.028)	(0.021)	(0.040)	(0.032)
Home Production	-0.516	-0.245	0.053	0.091	-0.158	-0.047	0.033	0.244
	(0.044)	(0.032)	(0.045)	(0.021)	(0.036)	(0.025)	(0.047)	(0.037)
Childcare	-0.341	-0.234	-0.317	-0.008	-0.281	-0.161	0.047	0.094
	(0.057)	(0.045)	(0.052)	(0.027)	(0.048)	(0.029)	(0.060)	(0.051)
Alone	0.139	0.078	0.120	0.073	0.151	0.064	0.031	0.064
	(0.028)	(0.023)	(0.031)	(0.017)	(0.024)	(0.019)	(0.034)	(0.027)
Person Fixed Effects	No	Yes	No	Yes	No	Yes	No	Yes
Observations	90,567	89,326	90,567	89,326	90,567	89,326	90,567	89,326
Adjusted R^2	0.035	0.707	0.020	0.843	0.016	0.735	0.038	0.704

Notes: See the notes for Table 6. In contrast to that table, the dependent variable includes individual negative affect measures.

Table C.3: Emotional Well-Being Measures by Activity Group and Alone Status

	Net Affect		Unhappiness		Happiness		Meaning	
Leisure at Home	0.327	0.221	-0.052	-0.024	0.119	0.098	-0.594	-0.522
*Not Alone	(0.089)	(0.051)	(0.014)	(0.011)	(0.058)	(0.040)	(0.062)	(0.055)
Leisure at Home	-0.233	-0.112	0.020	0.023	-0.352	-0.190	-1.187	-0.996
*Alone	(0.086)	(0.055)	(0.014)	(0.013)	(0.057)	(0.043)	(0.057)	(0.061)
Leisure out of Home	1.021	0.533	-0.125	-0.053	0.538	0.347	0.135	0.228
*Not Alone	(0.088)	(0.052)	(0.013)	(0.011)	(0.056)	(0.041)	(0.059)	(0.054)
Leisure out of Home	0.252	-0.047	-0.030	0.017	-0.002	-0.044	-0.351	-0.244
*Alone	(0.113)	(0.074)	(0.034)	(0.021)	(0.073)	(0.059)	(0.083)	(0.075)
Eating	0.727	0.458	-0.099	-0.059	0.366	0.263	0.114	0.139
*Not Alone	(0.070)	(0.046)	(0.011)	(0.010)	(0.046)	(0.035)	(0.047)	(0.049)
Eating	-0.159	-0.045	0.013	-0.004	-0.255	-0.078	-0.592	-0.514
*Alone	(0.090)	(0.061)	(0.014)	(0.014)	(0.059)	(0.046)	(0.063)	(0.059)
Home Production	0.001	-0.212	-0.003	0.017	-0.036	-0.173	-0.003	-0.195
*Not Alone	(0.088)	(0.059)	(0.016)	(0.013)	(0.057)	(0.047)	(0.055)	(0.055)
Home Production	-0.233	-0.367	-0.001	0.033	-0.310	-0.317	-0.339	-0.471
*Alone	(0.082)	(0.054)	(0.014)	(0.012)	(0.056)	(0.042)	(0.055)	(0.054)
Childcare	0.730	0.490	-0.080	-0.057	0.521	0.407	0.691	0.655
*Not Alone	(0.089)	(0.056)	(0.014)	(0.013)	(0.054)	(0.045)	(0.053)	(0.058)
Childcare	0.132	0.226	-0.023	-0.024	0.122	0.183	0.184	0.130
*Alone	(0.185)	(0.140)	(0.031)	(0.032)	(0.095)	(0.106)	(0.120)	(0.109)
Other Eligible Time	-0.699	-0.378	0.096	0.054	-0.554	-0.320	-0.520	-0.404
*Alone	(0.089)	(0.054)	(0.014)	(0.013)	(0.057)	(0.042)	(0.057)	(0.056)
Person Fixed Effects	No	Yes	No	Yes	No	Yes	No	Yes
Observations	90,567	89,326	90,567	89,326	90,567	89,326	90,567	89,326
Adjusted R^2	0.045	0.755	0.026	0.590	0.043	0.668	0.062	0.639

Notes: The table presents regression results, regressing activity-level emotional well-being measures against interactions of types of activity and whether the activity is alone. The omitted group is "Other Eligible" activities that are performed alone. In addition, the regression includes controls for the log(duration) as well as the 4-hour period of the day in which the activity occurs. Observations are weighted by the product of the ATUS sample weights and the duration of the activity. Each observation is a separate individual-activity combination.

alone. Comparing two adjacent rows allows one to measure — for each individual activity category — the difference in subjective well-being across alone status. For example, in a specification with person fixed effects (column 2), net affect while pursuing leisure at home is 0.33 ($\approx 0.221 + 0.112$) points lower than when alone. When pursuing leisure outside of the home, the difference in net affect is 0.58 ($\approx 0.533 + 0.047$). While there are interesting differences across activities, a common finding is that subjective well-being measures are lower when pursued alone.

Sensitivity Analysis Related to Figure 6

Since these variables may systematically vary with individuals' age, employment status, and other characteristics, I first (separately) regress c_{it}, u_{it}, and $x_{a,it}$ against the demographic controls employed in Figure 1. I then compute the residual from each of these regressions. Call $\widetilde{c}_{it}$, $\widetilde{u}$, and $\widetilde{x}_{a,it}$ the residuals from these regressions. To place the subjective well-being measures on a common scale, I divide $\widetilde{c}_{it}$ by its sample standard deviation and call the resulting variable $\widehat{c}_{it}$. Let $\widehat{u}_{it}$ refer to $\widetilde{u}_{it}$ divided by its standard deviation.

The top panel of Figure C.1 plots $\widehat{c}_{it}$ and $\widehat{u}_{it}$ against $\widetilde{x}_{a,it}$, illustrating that a greater share of time alone corresponds to lower subjective well-being. According to this figure, a 5 p.p. increase in alone time (roughly the differential in 2003 to 2019 growth in alone time for high-school-or-less relative to college-educated individuals) corresponds to a 0.016 standard deviation decrease in the Cantril ladder score and a 0.017 standard deviation increase in the U-index. The bottom panel of Figure C.1 plots the relationships between $\widehat{c}_{it}$,$\widehat{u}_{it}$ and $\widetilde{y}_{it}$, where the latter measure is computed as the residual of a regression of log household income, y_{it}, on the same demographic controls used in Figure 1. The average slope of the relationship between $\widehat{c}_{it}$ and $\widetilde{y}_{it}$ is 0.17, implying that a 5 p.p. differential in alone time has the same association with life evaluation as a 9 log point difference in household incomes.[26] A similar calculation, using $\widetilde{u}_{it}$ instead of $\widetilde{c}_{it}$, would indicate that a 5 p.p. differential in alone time corresponds to a 14 log point difference in household income. This 9 to 14 log point change in household income equivalent to a 5 p.p. increase in alone time is similar to, but somewhat smaller than, the 10 to 20 log point figures reported in the Section 5 discussion surrounding Figure 6.

Figure C.2 assesses the sensitivity of Figure C.1 to transformations of the Cantril ladder measure. First, I replace c_{it} with various indicators: $\mathbf{I}\{c_{it} \geq 6\}$, $\mathbf{I}\{c_{it} \geq 7\}$, and $\mathbf{I}\{c_{it} \geq 8\}$.[27]

[26] To arrive at this number, divide 0.016 (the standard deviations of $\widetilde{c}_{it}$, corresponding to a 5 p.p. alone time differential) by 0.17 (the slope of the relationship between$\widetilde{c}_{it}$ and household income).

[27] Within the sample, 22.7 percent of respondents report a Cantril ladder measure of 5 or lower, 11.1 percent report $c_{it} = 6$, 18.2 percent report $c_{it} = 7$, and 25.0 percent report $c_{it} = 8$. The remaining 23.0 percent of the sample report either a 9 or a 10. So, the cutoffs around 6, 7, and 8 surround the center of the

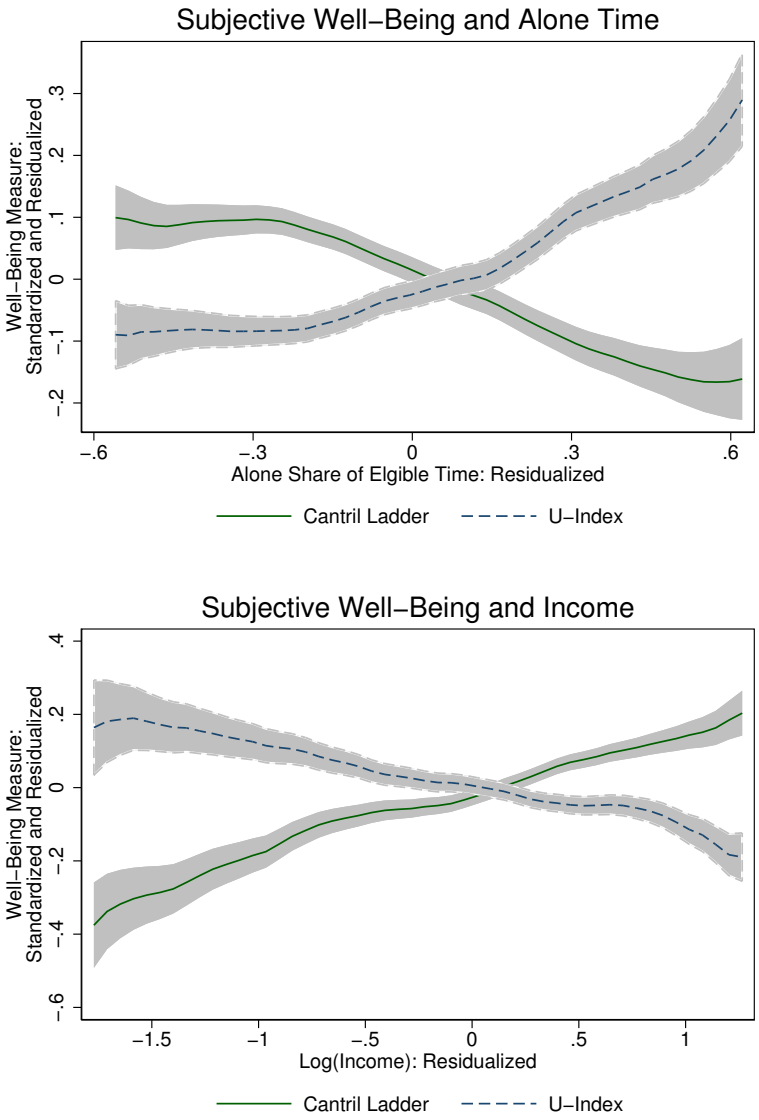

Figure C.1: Relationship between Well-Being, Income, and Alone Time: Controlling for Demographic Characteristics

Notes: To compute "Alone Share of Eligible Time: Residualized," $\widetilde{x}_{a,it}$, I first regress the alone share of eligible time against year fixed effects, survey month-of-year and day-of-week fixed effects, education group fixed effects, sex fixed effects, age group fixed effects, metropolitan status fixed effects, employment status fixed effects, race/ethnicity fixed effects, and the logarithm of the number of people in the household. For the definitions of these fixed effects, see the notes from Figure 1. I then take the residual from this regression. For the Cantril ladder score and the U-index, in separate regressions, I regress each of these measures against the same set of covariates listed above. I take the residual from each of these two regressions. I "standardize" each of these three residuals by dividing by their respective standard deviations. The sample in the top panel includes the 20,766 respondents to the well-being module with a non-missing Cantril ladder score and a non-missing U-index. In the bottom panel, I replace "Alone Share of Eligible Time" with log household income. For readability, in producing the top panel, I omit the bottom and top one percentile of $\widetilde{x}_{a,it}$. In producing the bottom panel, I omit the top and bottom one percentile of $\widetilde{y}_{it}$. The sample in the bottom panel includes the 18,606 individuals that have non-missing Cantril ladder and U-index measures and also have non-missing log household income data.

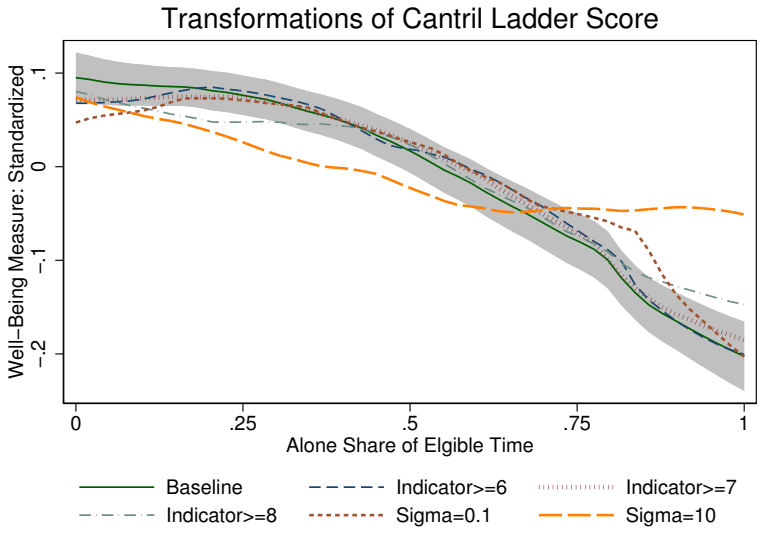

Figure C.2: Relationship between Well-Being and Alone Time: Alternate Transformations
Notes: I consider the sensitivity of the relationship between alone time and life evaluation (according to the "Cantril ladder" measure). The baseline measure applies no transformation to the data. The "Indicator≥6" replaces c_{it} with $\mathbf{I}\{c_{it}\geq 6\}$, with analogous transformations applied to "Indicator≥7," and "Indicator≥8." Finally, the "Sigma=0.1" transformation replaces c_{it} with $10\left(\frac{c_{it}}{10}\right)^{0.1}$, with an analogous transformation applied to "Sigma=10". To make all of these plots comparable, I standardize each well-being measure: From each measure, I first subtract off the measure's sample mean and then divide by its sample standard deviation.

Second, under the recommendation of Bloem (2021), I apply two alternate transformations, replacing c_{it} with $10\left(\frac{c_{it}}{10}\right)^{\sigma}$ for $\sigma \in \{0.1, 10\}$. (Bloem, 2021 considers values of σ below 0.1 or above 10 to be extreme and implausible.) For each of these five transformations, I plot the relationship between the standardized and transformed c_{it} and the fraction of eligible time that is spent alone. The $10\left(\frac{c_{it}}{10}\right)^{10}$ transformation results in a weaker relationship with $x_{a,it}$ for above-median values of $x_{a,it}$; the $\mathbf{I}\{c_{it} \geq 6\}$ transformation results in a weaker relationship with $x_{a,it}$ for below-median values of $x_{a,it}$. However, across all five transformations, life evaluation is significantly, negatively related to time spent alone.

Finally, Figure C.3 considers alternate measures of emotional and eudaimonic well-being. The top panel compares time alone to positive affect measures: the average happiness reported in the activities within the respondent's time diary, the net affect (defined as the difference between the positive and negative emotions), and the average meaning ascribed to activities within the time diary. Except for the fact that the U-index is a measure of low emotional well-being, while the other three variables provide a measure of high well-being, the three measures paint a consistent relationship between well-being and time alone. The bottom panel plots the relationship between time alone and individual negative affect measures. While all four negative affect measures are correlated with time alone, the relationships are somewhat stronger for the sadness and pain measures, somewhat weaker for the stress measure, and essentially non-existent with the tiredness measure.

Table C.4 summarizes the different specifications applied in Figures 6, C.1, C.2, and C.3. With the sole exception of "tiredness", greater alone time is negatively related to life satisfaction, individual subjective well-being measures, and any transformation or combination thereof. Again, with the exception of tiredness, a 5 p.p. increase in alone time corresponds to a 0.07 standard deviation (for the transformed Cantril ladder measure, with $\sigma = 10$) to a 0.24 standard deviation (for average reported happiness) difference in subjective well-being.

Relationship between Time Alone and Health Measures

In this final exercise of the appendix, I consider whether measures of health are correlated to those of time spent alone. The goal of this exercise is to understand whether time alone trends are a reflection of the already well-documented rise of deaths of despair (Case and Deaton, 2015, 2017). This is a reasonable hypothesis, as both increases in alone time (Section 4 of this paper) and deaths of despair (Case and Deaton, 2022) are concentrated among the same groups of individuals, including those without a college degree.

In Table C.5, I regress two measures that are recorded in the 2010, 2012, and 2013 ATUS well-being modules. In these modules, individuals are asked whether they took pain med-

life satisfaction distribution.

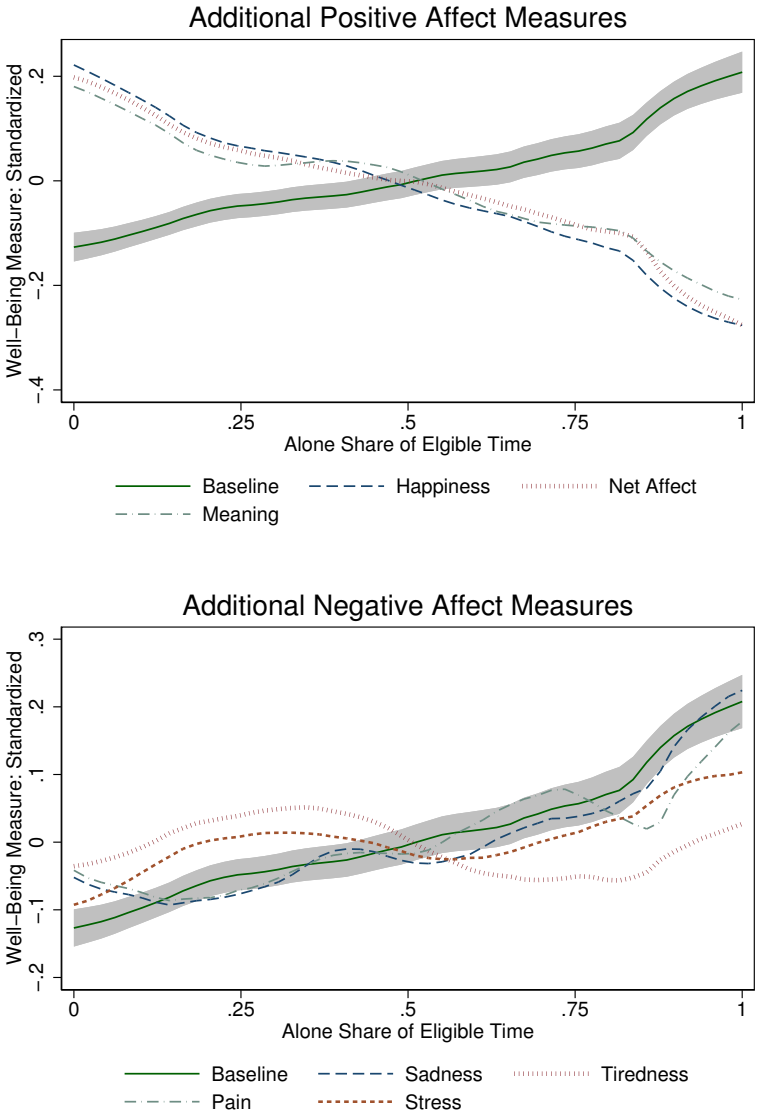

Figure C.3: Relationship between Well-Being and Alone Time: Alternate Measures
Notes: The top panel considers alternate measures of everyday emotional well-being: happiness, meaning, and net affect. Net affect equals the difference between happiness and the mean of the individual's reported pain, sadness, stress, and tiredness. The bottom panel considers the relationship between time alone and individual negative affect measures.

Table C.4: Summary in the Relationship between Alone Time and Subjective Well-Being Measures

Measure or Specification	Figure	Slope of Relationship with Alone Time
Cantril Ladder	Figure 6	-0.321
U-Index	Figure 6	0.317
Cantril Ladder, Residualized	Figure C.1	-0.319
U-Index, Residualized	Figure C.1	0.327
Indicator: Cantril Ladder $\geq$6	Figure C.2	-0.291
Indicator: Cantril Ladder $\geq$7	Figure C.2	-0.284
Indicator: Cantril Ladder $\geq$8	Figure C.2	-0.241
Transformed Cantril Ladder: $\sigma = 0.1$	Figure C.2	-0.247
Transformed Cantril Ladder: $\sigma = 10$	Figure C.2	-0.145
Happiness	Figure C.3	-0.485
Net Affect	Figure C.3	-0.432
Meaning	Figure C.3	-0.379
Sadness	Figure C.3	0.262
Tiredness	Figure C.3	-0.009
Pain	Figure C.3	0.222
Stress	Figure C.3	0.147

Notes: This table collects coefficient estimates of standardized subjective well-being measures on the alone share of eligible time. The first column provides a short description of the subjective well-being measure, the second column lists the figure in which the regression coefficient first appears, and the final column presents the corresponding regression coefficient.

ication in the previous day and whether they had high blood pressure in the previous five years. I estimate a linear probability model with each of these two health measures as an outcome variable and the share of eligible time spent alone as an explanatory variable. I also include the other controls applied in Figure 6. There is no statistically significant relationship between the fraction of time spent alone and high blood pressure. Time spent alone and pain medication are marginally statistically significant, with a greater fraction of time alone slightly negatively related to taking pain medication. Neither coefficient estimate is consistent with the hypothesis that the risk of a death of despair is correlated with aloneness.

D Time Alone and with Others: 1965 to 2018

This appendix examines trends in alone time in an earlier period, beginning in 1965. I use time use surveys from 1965 to 1966, 1975 to 1976, 2003, and 2018 as collected in the American Heritage Time Use Survey (AHTUS) (Fisher et al., 2018). The purpose of this section is to compare the trends documented in the paper — covering 2003 to 2022 — to those in this earlier period. To preview, there are three main results from this section: First, time spent alone increased between 1965 and 2003, though at a slower pace than between 2003 and 2022. Second, differences in trends between highly educated and less educated individuals are much less pronounced — if present at all — in this earlier period than between 2003 and 2022. Third, because the sample and design of surveys changed, even if subtly, across the various surveys, measurement of trends covering 1965 to 2003 are somewhat more tenuous than those related to the 2003 to 2022 period.

Within the existing literature, Sevilla et al. (2012) provide the definitive analysis of time spent with others in the 1965 to 2003 period.[28] As much as possible, even if it means deviating from the procedures elsewhere in the current paper, I follow the data cleaning and processing procedures outlined in Sevilla et al. (2012). There, the authors carefully measure changes in the scope and quality of leisure time within the United States between 1965 and 2003. They consider several indicators of the quality of leisure time, including whether there is a second, non-leisure activity that takes place concurrently; whether leisure episodes are broken up into short intervals or can be enjoyed in long, uninterrupted periods of time; and whether the leisure activity takes place with one's spouse or with an adult present. The paper finds that while the number of hours spent on leisure time increased, the quality of leisure time decreased. Individuals' leisure time is decreasingly spent with other adults, increasingly spent while concurrently undertaking a non-leisure activity, and increasingly fragmented. Furthermore, the decline in the quality of leisure is most severe for individuals

[28] I thank Jose Ignacio Gimenez-Nadal and Almudena Sevilla for generously sharing the code related to their 2012 paper.

Table C.5: High Blood Pressure, Pain Medication, and Alone Time

	High Blood Pressure	Pain Medication
Alone Share of Eligible Time	-0.005	-0.020
	(0.011)	(0.011)
Age: 30-39	0.086	0.049
	(0.007)	(0.010)
Age: 40-49	0.197	0.118
	(0.009)	(0.011)
Age: 50-59	0.338	0.191
	(0.010)	(0.011)
Age: 60-69	0.457	0.197
	(0.011)	(0.013)
Age: 70-85	0.486	0.195
	(0.013)	(0.014)
Non-White	0.075	-0.048
	(0.008)	(0.008)
White Hispanic	-0.018	-0.046
	(0.008)	(0.010)
Some College Education	-0.020	-0.007
	(0.008)	(0.009)
College Education	-0.056	-0.042
	(0.007)	(0.007)
Log Household Size	-0.034	-0.031
	(0.006)	(0.007)
Employed, Absent	0.040	0.081
	(0.019)	(0.021)
Unemployed, On Layoff	-0.005	0.003
	(0.038)	(0.039)
Unemployed, Looking	0.026	0.018
	(0.012)	(0.014)
Not in Labor Force	0.078	0.116
	(0.008)	(0.009)
Observations	33,149	33,149
Adjusted R^2	0.200	0.073

Notes: Each column presents a linear regression with a health measure – either taking pain medication or having high blood pressure – as the dependent variable, the alone share of the eligible time as an explanatory variable, and the controls used in Figure 6 as other controls. Included in the regression but not in the table (to fit the regression on a single page) are the day of the week the survey was taken, the month of the year the survey was taken, the year the survey was taken, the sex of the respondent, and whether the respondent lived in the center city of an MSA. The omitted category for age includes people aged 29 or younger; the omitted category for race/ethnicity includes White non-Hispanic individuals; the omitted category for education includes those with high school education or less; and the omitted category for employment includes those who are employed and at work.

without any college education.

Across three sets of surveys — one in 1965-1966, the second in 1975-1976, and the third in 2003 — Sevilla et al. (2012) record leisure activities as those including "watching television, sport activities, general out-of-home leisure, and socializing."[29] This definition excludes volunteer activities, gardening, and pet care.[30] Since the 1965 to 1966 survey includes only individuals who are aged between 19 and 64 and are neither students nor retired, following Sevilla et al. (2012), I restrict the sample for this appendix to include only individuals aged 21 to 65 and who are neither students nor retired. For each sampled individual, I record the fraction of leisure time that is (i) with the individual's spouse, (ii) with an adult,[31] or (c) alone.[32] In addition to these measures, I compute the share of non-work, non-sleep, non-personal care time that is spent alone.[33] In addition to the samples considered in Sevilla et al. (2012), to compare pre-2003 and post-2003 changes in an integrated manner, I include the 2018 sample as recorded in the AHTUS.

A critical challenge in measuring trends in time allocation over the last decades of the twentieth century is that the sample and survey design change from decade to decade. Sevilla et al. (2012), building on Egerton et al. (2005), carefully document the following differences across the surveys. Whereas the 1975 to 1976 and 2003 samples aim to represent the national adult population, the 1965 to 1966 sample aims to capture the working-age population. Furthermore, approximately two-fifths of the sample frame of the 1965 to 1966 sample consists of residents of Jackson, Michigan and surrounding areas, while the remaining 60 percent of the sample is drawn from 44 urban areas from around the country. Each of the three surveys was conducted at different points within the year: The 1965 to 1966 sample draws only on individuals sampled in November-May; the 1975 to 1976 sample respondents were surveyed only in certain months; samples in 2003 and beyond include respondents surveyed throughout the year. Furthermore, measures characterizing who the survey respondent was with vary in subtle ways from year to year.[34] Given these differences, as best as one can, Sevilla

[29] Sevilla et al. (2012) also employ surveys from the 1985 and 1992 to 1994. These surveys permit measurement of leisure fragmentation, but not whether another person was present while a leisure activity was taking place. For this reason, I omit consideration of these two surveys from this appendix.

[30] Using the activity codes in the AHTUS, leisure activities have a code between 50 and 89, excluding 67 and 68. See `https://www.ahtusdata.org/ahtus-action/variables/MAIN#codes_section` ; accessed October 31, 2023.

[31] Time with an adult includes time with (i) the individual's spouse, (ii) a well-known adult, or (iii) another household adult.

[32] Sevilla et al. (2012) focus on time with one's spouse and with adults to relate to the preceding analysis in Bittman and Wajcman (2000). I additionally consider the time alone variable to compare to trends discussed in Section 4.

[33] For this measure, I include all activities with the exception of 1-6 (personal care and sleep), 10-16 (work or schooling), and 18-19 (coursework).

[34] For instance, according to the AHTUS documentation file, in the 1965 to 1966 and 1975 to 1976

et al. (2012) construct their sample and variable definitions to maximize the comparability of their measures of leisure quantity and quality.

Panel A of Table D.1 presents summary statistics for the 1965 to 2018 sample. I compute the hours per week individuals pursue leisure activities, the share of leisure time spent with one's spouse, and the share of leisure time spent with adults. I separately present sample averages for individuals with 12 or fewer years of schooling ("low levels of education") and those with more than 12 years of schooling ("high levels of education"). Consistent with the main results of Aguiar and Hurst (2007) and Sevilla et al. (2012), leisure time increased considerably between 1965 and 2003, by approximately 5 hours per week for individuals with low levels of education and for males and by 2 hours per week for highly educated females. Furthermore, the share of leisure time spent with one's spouse or with adults more generally fell, on average, with the largest declines experienced by individuals with low levels of education. Within the first six columns, I compare my efforts at computing averages within the AHTUS to the figures appearing in Table 1 of Sevilla et al. (2012). Overall, the two columns align exceptionally well, with the potential exception of the number of leisure hours per week within the 1975 to 1976 sample. This concurrence is re-assuring, especially since the AHTUS has periodically been revised since Sevilla et al. (2012) was published.[35]

In the final two columns, I report measures of time spent alone, either as a share of the survey respondent's leisure activities or as a share of their non-work, non-sleep, non-personal care time. Consistent with trends in the fraction of leisure time spent with adults, the share of males' leisure time spent alone was 11 to 12 p.p. higher in the 2003 sample than in the 1965 sample. The corresponding difference for females was 5 p.p. The increase was of similar magnitude for individuals with and without a college degree.

As previously mentioned, the 1965 to 1966 survey draws on two samples. Approximately 40 percent of the sample consists of residents of Jackson, Michigan and its surrounding areas, while 60 percent of the sample is drawn from 44 urban areas from around the country. Panel B of Table D.1 compares time allocation in the two subsamples. Overall, respondents in Jackson, MI have similar levels of total leisure hours to the rest of the country (consistent with Aguiar and Hurst, 2007.) However, the share of time spent with other adults (or with

samples, the variable describing whether a spouse or partner was present equals 1 if a "spouse or fiancé" is present. In 2003 and beyond, this variable equals 1 if the respondent is with a "spouse or unmarried partner." See `https://www.ahtusdata.org/ahtus-action/variables/SPPART#comparability_section`; accessed October 13, 2022. This difference in definition may have a small but meaningful impact on measures of time spent with one's spouse or partner. As of 2003, approximately 5.1 percent of all households were households consisting of unmarried partners, approximately one-tenth as many households as those consisting of married partners (Elliott and Dye, 2005).

[35]The first versions of the AHTUS were developed by the Center for Time Use Research, and were uploaded onto IPUMS only in September 2015, three years after the publication of Sevilla et al. (2012). For a list of the key revisions since then, see `https://www.ahtusdata.org/ahtus-action/revisions`; accessed October 13, 2022.

one's spouse) is considerably higher in Jackson, MI, with larger differences for less educated individuals. For example, less-educated males' leisure time that is spent with adults is 8 p.p. higher — 79 percent vs. 71 percent — in the Jackson, MI subsample than in the national subsample. The corresponding difference for less educated females is 9 p.p. For individuals with some college education, the difference across the two subsamples is approximately half as large. Given these differences, a salient concern is that the inclusion of a single metro area — one that is less urban, with a higher share of White individuals, and with a lower share of individuals with some college education — may be disproportionately affecting conclusions about who individuals are spending their time with in 1965. As a result, the over-representation of Jackson, MI in the 1965 sample may yield an upwardly biased depiction of national trends in time spent alone, where this bias may be greater for individuals with less education.

Holding these concerns aside for a moment, I estimate trends in time spent with one's spouse, with other adults, and alone. For individual i in sample t, call these different variables: $x_{s,it}$, $x_{o,it}$, and $x_{a,it}$ (s for "spouse", o for adults "other" than the survey respondent, and a for "alone". I estimate:

$$x_{\theta,it} \quad = \quad \beta_t + \gamma_t \cdot \text{Education}_{it} + \alpha_e' \mathbf{X}_{i,t} + \varepsilon_{it} \text{ , for } \theta \in \{s, o, a\}. \tag{11}$$

Within this equation, Education_{it} is an indicator variable equal to 1 if individual i has more than 12 years of schooling. $\mathbf{X}_{i,t}$ include the two individual-level controls applied in Sevilla et al. (2012): the age of the individual (a continuous measure) and whether there are any children in the household. The coefficients α_e are allowed to vary according to the educational status of the individual (whether the individual has any college education or not). The coefficients of interest are β_t and γ_t. The former describes overall changes in time allocation relative to 1965; the latter characterizes changes in time allocation for those with college education relative to those with a high school degree or less. The first four columns of Table D.2 mirror Table 2 of Sevilla et al. (2012). As in that paper, I find a dramatic reduction in time spent with one's spouse and with other adults for males, and with an increased differential in time spent with one's spouse or other adults between college educated and less educated individuals.[36] The final four columns estimate Equation 11 for both males and females jointly. In the final two columns, I examine trends in time alone. Whether one looks at time alone in leisure activities (column 7) or time alone in non-work, non-sleep, non-personal care activities (column 8), I find that time alone increased

[36]Reading across columns (1) through (4) of Table D.2, the corresponding estimates of β_{2003} in Table 2 of Sevilla et al. (2012) are, respectively, -0.060, -0.105, 0.027, and -0.047. The corresponding estimate of γ_{2003} are 0.062, 0.038, 0.054, and -0.002, respectively.

considerably, by 5 to 7 p.p., between 1965 and 2013. However, there is no greater (or lesser) change in the fraction of time spent alone for college educated individuals compared to those with at most a high school diploma.

As the final rows of Table D.1 suggest, shares of time with others and alone differ across the Jackson, MI and national subsamples of the 1965 to 1966 sample. This section's final exercise explores whether these differences are salient for assessing trends beginning in 1965. To do so, I amend Equation 11 regression as follows:

$$x_{\theta,i\tau} \quad = \quad \beta_\tau + \gamma_\tau \cdot \text{Education}_{i\tau} + \alpha_e \mathbf{X}_{i,\tau} + \varepsilon_{i\tau} \text{ , for } \theta \in \{s, o, a\}. \tag{12}$$

In Equation 12, τ indexes a survey sample for survey waves beginning in 1975 to 1976. For the 1965 to 1966 wave, τ has distinct values for the Jackson, MI subsample and the national subsample. In my estimation of Equation 12, the omitted category includes individuals surveyed in the national subsample within the 1965 to 1966 wave. As a result, estimates of β_τ and γ_τ each permit comparison among (i) national samples across the survey years, as well as (ii) the two different subsamples within the 1965 to 1966 wave. To emphasize, I choose the national subsample within the 1965 to 1966 wave as the omitted group — and not the Jackson, MI subsample — to facilitate like-for-like comparisons across years.

Table D.3 presents estimates of Equation 12. As estimates of $\beta_{1965,\text{Jackson}}$ indicate, survey respondents within the Jackson, MI subsample spend a significantly larger fraction of their time with adults and with their spouse, and considerably less time alone, compared to those in the national subsample of the 1965 to 1966 wave. Concomitantly, estimates of the 1965 to 2003 growth in time alone are meaningfully smaller: 3.5 to 4 p.p. in Table D.3 relative to 5 to 7 p.p. in Table D.2. Declines in the time spent with adults are also considerably more modest.

Furthermore, differences in 1965 to 2003 trends across educational groups are also more modest in Table D.3 than in Table D.2. For example, whereas column (5) of Table D.2 suggested that the share of leisure time spent with one's spouse increased by 5.7 p.p. more for highly educated than less educated individuals, the analogous estimate from Table D.3 is 4.1 p.p. The corresponding gaps between estimates of γ_{2003} in columns (6) through (8) are also roughly 2 p.p.

Finally, consistent with the results in Section 4 of the paper, Table D.3 estimates of $\beta_{2018} - \beta_{2003}$ and $\gamma_{2018} - \gamma_{2003}$ indicate that the increase in time alone has accelerated since 2003, with larger increases for individuals without any college education. For instance, according to column (8) of Table D.3, time alone increased by approximately $5.5 (\approx 9.2 - 3.7)$ p.p. between 2003 and 2018, with increases slower by $3.6 (\approx -2.3 - 1.3)$ p.p. for individuals with at least some college education.

Table D.1: Leisure, Time with Others, and Time Alone: 1965-2018

			(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Panel A: All Years			Leisure		Share w/ Spouse		Share with Adults		Share Alone	
Sample	Sex	Educ.	This Paper	SGG (2012)	This Paper	SGG (2012)	This Paper	SGG (2012)	Leisure	Free Time
1965-1966	M	Low	29.28	29.29	0.609	0.592	0.749	0.744	0.239	0.301
1975-1976	M	Low	31.19	27.90	0.607	0.602	0.714	0.713	0.279	0.331
2003	M	Low	34.96	35.75	0.557	0.542	0.615	0.612	0.357	0.424
2018	M	Low	35.31		0.591		0.497		0.458	0.503
1965-1966	M	High	25.90	25.94	0.530	0.517	0.684	0.691	0.289	0.333
1975-1976	M	High	29.78	26.01	0.586	0.592	0.694	0.678	0.303	0.359
2003	M	High	31.23	32.13	0.541	0.523	0.581	0.587	0.395	0.455
2018	M	High	32.00		0.579		0.533		0.417	0.483
1965-1966	F	Low	27.33	27.35	0.470	0.458	0.698	0.688	0.292	0.376
1975-1976	F	Low	33.35	33.05	0.514	0.444	0.718	0.685	0.281	0.327
2003	F	Low	32.26	33.02	0.503	0.491	0.637	0.627	0.340	0.388
2018	F	Low	32.39		0.485		0.553		0.424	0.444
1965-1966	F	High	26.48	26.55	0.412	0.405	0.646	0.659	0.324	0.399
1975-1976	F	High	30.05	27.54	0.459	0.476	0.663	0.658	0.322	0.346
2003	F	High	28.98	29.31	0.507	0.498	0.608	0.603	0.368	0.410
2018	F	High	27.55		0.543		0.568		0.389	0.433
Panel B: 1965-1966			Leisure		Share w/ Spouse		Share with Adults		Share Alone	
National	M	Low	28.18		0.568		0.713		0.271	0.312
Jackson, MI	M	Low	30.57		0.657		0.793		0.200	0.289
National	M	High	25.97		0.524		0.671		0.294	0.334
Jackson, MI	M	High	25.71		0.549		0.719		0.274	0.331
National	F	Low	27.96		0.448		0.663		0.328	0.396
Jackson, MI	F	Low	26.34		0.502		0.752		0.236	0.345
National	F	High	25.97		0.389		0.635		0.324	0.388
Jackson, MI	F	High	27.75		0.470		0.672		0.324	0.424

Notes: The sample includes respondents to surveys included in the 1965 to 66, 1975 to 1976, 2003, and 2018 subsamples of the American Heritage Time Use Survey who have an age between 21 and 65, who are not retired, and who are not students. For the columns labeled "Share with Spouse," the sample is further restricted to individuals who are married. "Leisure" is measured as hours per week. High levels of education refer to having more than 12 years of schooling. Low levels of education refer to having 12 or fewer years of schooling. The columns labeled "SGG (2012)" are copied directly from Table 1 of Sevilla et al. (2012). Leisure activities include those with activity code between 50 and 89, excluding 67 and 68. Eligible time includes all non-work, non-personal care, non-sleep activities. These are activities 1-99 with the exception of 1-6 (personal care and sleep), 10-16 (work or schooling), and 18-19 (coursework). Observations are weighted according to the recommended AHTUS sample weight.

Table D.2: Estimates of Equation 11

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Spouse	Adults	Spouse	Adults	Spouse	Adults	Alone	Alone
β_{1975}	-0.010	-0.027	0.047	0.022	0.020	-0.001	0.008	-0.016
	(0.024)	(0.019)	(0.019)	(0.015)	(0.015)	(0.012)	(0.012)	(0.008)
β_{2003}	-0.055	-0.112	0.035	-0.055	-0.008	-0.083	0.069	0.053
	(0.019)	(0.016)	(0.018)	(0.014)	(0.013)	(0.011)	(0.010)	(0.007)
γ_{1975}	0.062	0.068	-0.017	-0.025	0.024	0.025	-0.008	-0.003
	(0.040)	(0.034)	(0.039)	(0.032)	(0.028)	(0.023)	(0.022)	(0.015)
γ_{2003}	0.069	0.042	0.056	0.015	0.057	0.030	-0.011	-0.002
	(0.033)	(0.028)	(0.032)	(0.027)	(0.023)	(0.019)	(0.019)	(0.013)
Sex	Male	Male	Female	Female	Both	Both	Both	Both
Leisure Only?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No
Married Only?	Yes	No	Yes	No	Yes	No	No	No
Observations	5,670	7,711	6,491	9,769	12,161	17,480	17,480	17,993
Adjusted R^2	0.024	0.097	0.045	0.110	0.037	0.100	0.101	0.178

Notes: The table presents coefficients estimates, and corresponding robust standard errors, of β_t and γ_t as defined in Equation 11. The omitted education group includes individuals with no college education. The omitted year includes individuals surveyed in 1965 to 1966, either as part of the Jackson, MI subsample or the national subsample. Each column is a separate regression estimation. The sample coincides with that of Table D.1, additionally excluding respondents surveyed in 2018. Observations are weighted according to the recommended AHTUS sample weight. Leisure time with one's spouse is only defined for married individuals. The row "Leisure Only?" describes whether only leisure activities are used when computing $x_{\theta,i\tau}$. If not, all non-sleep, non-personal-care, non-work activities are used.

In sum, between 1965 and 2003 the fraction of time Americans spend with other adults declined, while the share of their time they spend alone increased. These increases were faster over the 2003 to 2018 period (covering much of the sample in the paper) compared to the 1965 to 2003 period that the existing literature has explored. Furthermore, over the 1965 to 2003 period, assessments of whether time with others decreased more sharply for less educated individuals depend on (i) the particular measure of with whom the respondent is spending his/her time and on (ii) whether one includes respondents from Jackson, MI in the 1965 to 1966 sample. In contrast, since 2003, trends that vary across education groups are robust to the measure applied.

Table D.3: Estimates of Equation 12

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Spouse	Adults	Spouse	Adults	Spouse	Adults	Alone	Alone
$\beta_{1965,\text{Jackson}}$	0.084	0.074	0.053	0.077	0.070	0.078	-0.075	-0.035
	(0.031)	(0.026)	(0.029)	(0.023)	(0.021)	(0.017)	(0.017)	(0.012)
β_{1975}	0.029	0.009	0.068	0.052	0.050	0.032	-0.023	-0.031
	(0.029)	(0.024)	(0.023)	(0.019)	(0.018)	(0.015)	(0.015)	(0.010)
β_{2003}	-0.016	-0.076	0.056	-0.025	0.022	-0.049	0.036	0.037
	(0.025)	(0.021)	(0.022)	(0.018)	(0.017)	(0.014)	(0.013)	(0.009)
β_{2018}	0.021	-0.181	0.035	-0.091	0.031	-0.136	0.114	0.092
	(0.031)	(0.026)	(0.030)	(0.023)	(0.022)	(0.017)	(0.017)	(0.012)
$\gamma_{1965,\text{Jackson}}$	-0.052	0.000	0.023	-0.025	-0.018	-0.016	0.047	0.033
	(0.067)	(0.054)	(0.062)	(0.050)	(0.046)	(0.037)	(0.036)	(0.024)
γ_{1975}	0.030	0.054	-0.018	-0.039	0.007	0.011	0.014	0.010
	(0.046)	(0.039)	(0.044)	(0.037)	(0.032)	(0.027)	(0.026)	(0.017)
γ_{2003}	0.040	0.028	0.056	-0.001	0.041	0.014	0.013	0.013
	(0.040)	(0.035)	(0.039)	(0.033)	(0.028)	(0.024)	(0.023)	(0.015)
γ_{2018}	0.044	0.089	0.119	0.037	0.075	0.064	-0.051	-0.023
	(0.045)	(0.038)	(0.045)	(0.037)	(0.032)	(0.026)	(0.025)	(0.018)
Sex	Male	Male	Female	Female	Both	Both	Both	Both
Leisure Only?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No
Married Only?	Yes	No	Yes	No	Yes	No	No	No
Observations	7,180	10,158	8,150	12,627	15,330	22,785	22,785	23,477
Adjusted R^2	0.023	0.116	0.047	0.120	0.037	0.116	0.111	0.191

Notes: The table presents coefficient estimates, and corresponding robust standard errors, of β_τ and γ_τ as defined in Equation 12; $\beta_{1965,\text{Jackson}}$ and $\gamma_{1965,\text{Jackson}}$ compare the Jackson, MI subsample to the national subsample of the 1965 to 1966 survey. Each column is a separate regression estimation. The omitted education group includes individuals with no college education. The omitted survey group includes individuals surveyed in 1965 to 1966, as part of the national subsample. The sample coincides with that of Table D.1. Observations are weighted according to the recommended AHTUS sample weight. Leisure time with one's spouse is only defined for married individuals. The row "Leisure Only?" describes whether only leisure activities are used when computing $x_{\theta,i\tau}$. If not, all non-sleep, non-personal-care, non-work activities are used.