

# A Twenty-First Century of Solitude?

## Time Alone and Together in the United States

Enghin Atalay\*

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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 spending 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 inequality may be increasing more quickly than previous research has reported.

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\*Atalay: Research Department, Federal Reserve Bank of Philadelphia, atalayecon@gmail.com. I thank Sarada, Roc Armenter, Harley Frazis, Sabrina Pabilonia, and seminar participants at the 44th International Association for Time Use Research Conference and the Bureau of Labor Statistics for helpful comments. The views expressed in this paper are solely those of the author and do not necessarily reflect the views of the Federal Reserve Bank of Philadelphia or the Federal Reserve System.

# 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 who individuals spend their time with using the American Time Use Survey (ATUS). For each year between 2003 and 2021, survey respondents were asked to provide detailed information of the previous day’s activities: how, where, and with whom the survey respondent 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 who 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 2012 and 2013 ATUS, I evaluate the potential importance of these trends in time spent alone.

Americans increasingly spend their free time alone.<sup>1</sup> Between 2003 and 2019, the share of time spent alone increased from 43.5 percent to 48.7 percent. It then further increased, to 2021, likely to a large extent a result of the COVID-19 pandemic, to 50.5 percent. 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, then to 14.1 percent by 2021.

Trends in time alone vary substantially across demographic, educational, and income categories. At the beginning of the sample, individuals with high school education or less spent a slightly smaller fraction of their time (42.9 percent vs. 43.9 percent) alone relative to college-educated individuals. By 2019, alone time in the high-school-or-less group was 4.7 percentage points higher than in the college-or-more group. A similar differential trend exists

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<sup>1</sup>The ATUS asked, consistently, throughout the 2003 to 2021 period, respondents with whom activities took place excluding time at work, time sleeping, and time on personal grooming activities. As a result, the measures I develop will focus on non-work, non-sleep, non-personal time. For lack of a better phrase, I will apply the term “free time” to refer to the activities for which individuals are asked who they were with.

between individuals in low-income households (a 3.4 p.p. increase in alone time) relative to those in high-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 — age, urban status, employment status, etc. — 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 free time enjoying leisure at home – and, in particular, watching television – 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 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 high school education or less compared to those with college education or more, corresponds to a decline in well-being equivalent to a 9 to 16 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 who individuals spend their time with is an important, previously unmeasured channel of increasing inequality across households.

Section 2 places these results in the literature. 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.<sup>2</sup>

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<sup>2</sup>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

## 2 Literature Review

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

Within the first literature, [Aguiar and Hurst \(2007\)](#) study trends in leisure between 1965 and 2003. Over that period, both the average and dispersion in the amount 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. ([Aguiar and Hurst, 2016](#) find that these trends continue up to 2013.) 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, implying that welfare inequality may be larger than previously thought. Similar to these papers, this paper re-examines trends in inequality with time use data. In contrast, it adds information about not only what activities individuals pursue but also with whom individuals spend their time.<sup>3</sup>

A second 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, 2021](#); and [Appau et al., 2019](#)) and the development of social capital ([Putnam, 1995, 2000](#)). Within this section literature, and closer to the focus of the current paper, are analyses of surveys on time spent alone: [Twenge et al. \(2019\)](#); [Drotning \(2020\)](#); [Hamermesh \(2020\)](#); [Burlina and Rodríguez-Pose \(2021\)](#); and [Anttila et al. \(2020\)](#).<sup>4</sup> [Drotning \(2020\)](#) and [Hamermesh \(2020\)](#),

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alone and with others for an earlier period, beginning in 1965.

<sup>3</sup>Closer to the focus of this paper, [Sevilla et al. \(2012\)](#) re-examine 1965 to 2003 trends in well-being inequality by measuring the “quality” of leisure time. They conceptualize quality leisure time as one 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 leisure time increased, and especially so for individuals with low levels of education. However, the quality of leisure time decreased, with the largest declines occurring for those without any college education. Relevant for the current study, they report that 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 percentage points 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.

<sup>4</sup>In addition to various time use surveys, social scientists have employed the General Social Survey

as in the current paper, also measure time spent alone using the ATUS. [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 spouse 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. Relative to existing work, the contribution of the current paper is to document trends in the individuals people spend their time with in the US, to explore heterogeneity across groups in these trends, and to gauge the implications of this heterogeneity for inequality across households.

### 3 Dataset and Variable Definitions

This paper employs data from the American Time Use Survey ([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 — and is completed during the final month they are in the CPS sample. ATUS survey 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 the survey respondent, including information on the participants’ educational 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. Throughout the analysis, I apply the ATUS sampling weights.

In measuring with whom individuals spend their time, I consider two alternate categorizations. In a first categorization, I consider whether an activity is conducted (a) alone, (b) with other individuals from the respondent’s household, or (c) with other individuals

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(GSS) to measure social isolation, drawing mixed conclusions on their 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.

outside of the respondent’s household. Since the ATUS allows respondents to list multiple individuals with whom the respondent spent their time, a given activity may potentially fall in groups (b) and (c) simultaneously.<sup>5</sup>

A second categorization focuses on 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”).<sup>6</sup>

For each individual  $i$  in the ATUS sample, I compute  $x_{\theta,it}$  as the share of their time spent with individuals in category  $\theta$  (with the understanding that  $\theta$  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 additionally exclude time spent at work.<sup>7</sup> I refer to  $x_{\theta,it}$  as the share of “free time” spent with individuals in category  $\theta$ .

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) 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. See Appendix A for

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<sup>5</sup>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. In Appendix B, I measure trends in time spent alone (according to the ATUS measures) in activities with an on-line social component. I find that these activities account for at most a small increase in the average amount of time individuals spend alone, and none of differential trends in time alone that exist according to individuals’ race and ethnicity, or between college graduates and those with no college education. Consistent with (Kimbrough, 2019), increased time spent on video games can explain up to 2 percentage points of the differential trend in the share of time alone between young (age 18 to 39) and old (age 40 and above) individuals, and 1 percentage point of the differential trend in time alone between males and females.

<sup>6</sup>Specifically, a spouse or partner refers to a “Spouse” or an “Unmarried Partner”; a child refers to an “Own Household Child”, a “Grandchild”, a “Foster 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). All other individuals — “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) — are placed in a final category.

<sup>7</sup>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. In addition, the ATUS only included information on with whom respondents spent their time at work beginning in 2010. For this reason, to maintain consistency throughout the 2003 to 2021 sample, I omit time at work when calculating  $x_{\theta,it}$ . Between 2010 and 2019 there were essentially no trends in work time that is spent alone. Between 2019 and 2020, as a result of the COVID-19 pandemic, the alone share of work time increased by 13 percentage points, with greater-than-average increases in alone time for highly educated individuals, and with no differences between men and women, young and old, or White and non-White individuals.

the list of activities within each of these categories.

Table 1 summarizes the sample: It contains 18 years of data, covering time diaries for 219,000 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 who 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 2021. (Since time use in 2020 and 2021 are uniquely affected by the COVID-19 pandemic, throughout the paper I will tend to report values for both 2019 and 2021 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 in 2021. 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 free 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 7.0 percentage points (to 50.5 percent), with about 1.8 percentage points of the increase occurring between 2019 and 2021. The increase in time alone is concentrated in individuals with no college degree (a 6.8 p.p. increase between 2003 and 2019, a 9.8 p.p. increase between 2003 and 2021), 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.

Table 1: Summary Statistics

Panel A: Hours, by Activity		2003	2019	2021										
Childcare		0.51	0.45	0.43										
Eating		1.23	1.18	1.19										
Home Production		1.76	1.67	1.80										
Leisure At Home		3.79	4.06	4.35										
Leisure Outside		1.36	1.20	0.98										
Other Non-Work Time		2.61	2.43	2.27										
Panel B: Share, by Companion		Time Alone			With Indivs. from Other HHs			With Indivs. from Same HH			Count			
Demographic Group		2003	2019	2021	2003	2019	2021	2003	2019	2021	2003	2019	2021	All Years
Entire Sample		0.435	0.487	0.505	0.219	0.173	0.141	0.402	0.383	0.387	19,757	9,183	8,851	219,221
$\leq$ High School		0.429	0.504	0.517	0.220	0.162	0.142	0.401	0.368	0.371	8,465	2,923	2,648	82,951
Some College		0.445	0.499	0.558	0.238	0.190	0.149	0.372	0.352	0.317	3,772	1,547	1,468	39,794
$>$ College		0.439	0.467	0.479	0.207	0.177	0.139	0.419	0.408	0.422	7,520	4,713	4,735	96,476
Young (Age $\leq$ 49)		0.389	0.438	0.460	0.241	0.185	0.152	0.429	0.424	0.424	11,684	4,183	4,008	116,850
Old (Age $\geq$ 50)		0.510	0.544	0.556	0.184	0.160	0.130	0.357	0.337	0.345	8,073	5,000	4,843	102,371
Low HH Income		0.469	0.539	0.553	0.219	0.168	0.144	0.354	0.324	0.328	6,840	3,856	3,378	81,378
Medium HH Income		0.417	0.472	0.505	0.221	0.170	0.136	0.422	0.400	0.393	6,144	2,811	2,818	70,438
High HH Income		0.400	0.434	0.452	0.223	0.184	0.144	0.448	0.444	0.446	4,424	2,516	2,655	54,299
Male		0.445	0.509	0.522	0.217	0.161	0.133	0.386	0.367	0.375	8,573	4,172	4,015	96,018
Female		0.426	0.466	0.489	0.221	0.185	0.149	0.416	0.399	0.398	11,184	5,011	4,836	123,203
White, Non-Hispanic		0.439	0.474	0.500	0.218	0.178	0.144	0.404	0.399	0.392	14,495	6,252	5,899	149,288
Non-White		0.465	0.551	0.553	0.236	0.161	0.131	0.344	0.314	0.336	3,237	1,804	1,784	42,376
White, Hispanic		0.372	0.460	0.463	0.200	0.168	0.147	0.470	0.407	0.433	2,025	1,127	1,168	27,557

Notes: Panel A presents time spent in non-work activities (hours per day) for which a survey respondent provides information on the identity of “with whom” the activity was performed. This is equal to the total amount of time for the first four categories. “Other Non-Work Time” includes sleeping, personal grooming and other activities where the respondent does provide not this information. The total amount of “Other Non-Work Time” is 11.27 hours per day in 2003, 11.00 hours per day in 2019, and 11.02 hours per day in 2021. Panel B provides the fraction of free 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.



## 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’ non-working, non-personal time is increasingly conducted alone, then explore heterogeneity in the extent to which alone time has increased over time. 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?

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

$$x_{a,it} = \beta_{a,t} + \beta'_a \mathbf{X}_{i,t} + \varepsilon_{a,it}, \quad (1)$$

where  $x_{a,it}$  equals the fraction of non-working, non-personal 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. The top left panel of 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  $\mathbf{X}_{i,t}$ . (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 the day-of-week and the month-of-the-year, which it is with the appropriate sample weights, inclusion or exclusion of these controls should have no impact on estimates of  $\beta_{a,t}$ .) Relative to 2003, the fraction of time spent alone increased by 5.2 percentage points by 2019, and an additional 1.8 percentage points between 2019 and 2021.<sup>8</sup> 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, and sex reduces the 2003 to 2021 increase in the fraction of time spent alone to 5.7 percentage points. Additional controls for education, metropolitan status (whether the individual lives in the center city within an MSA or not), employment status, and the number of individuals within the household have a minimal effect.<sup>9</sup>

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<sup>8</sup>In Appendix Table B.1, I consider alone time in 2020 and 2021, directly before and during the COVID-19 pandemic. Though there is considerable noise with quarterly averages, the share of time spent alone was higher by approximately 2 percentage points in 2020Q3-2021Q1 relative to 2021Q2-2021Q4 or 2020Q1. Frazis (2022) discusses, in further detail, alone time during the COVID-19 pandemic.

<sup>9</sup>Whether to include certain controls – such as the number of individuals in the household – is open to

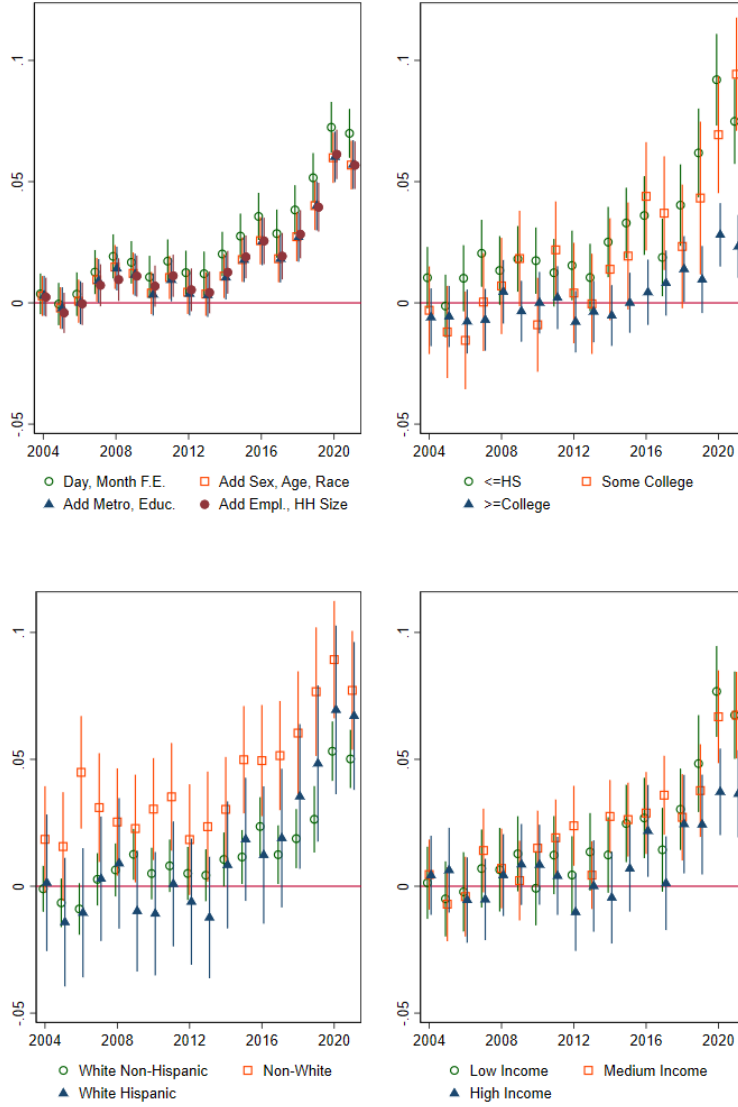


Figure 1: Estimates of trends in time spent with groups of individuals  
Notes: Continued on the following page.

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 our  $\beta_{a,t}$  coefficients are unchanged with the inclusion of household size as a covariate signifies that our results are not merely a reflection of declining household sizes, a pattern documented in [Klinenberg \(2013\)](#) and [Doepke and Tertilt \(2016\)](#), among others.

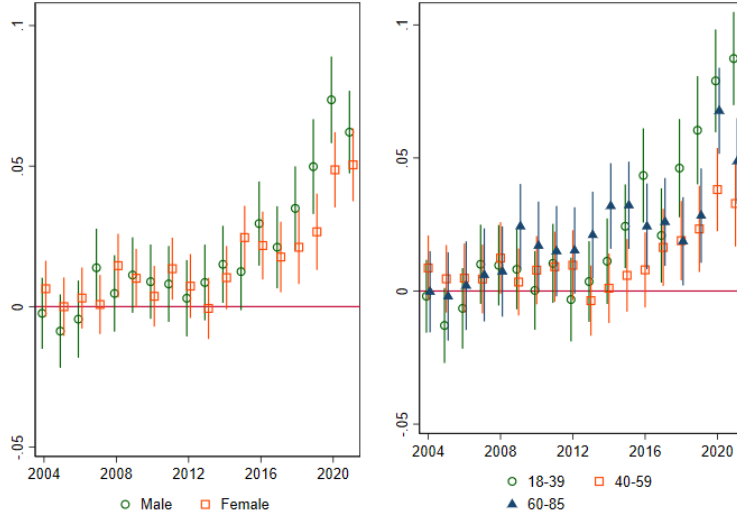


Figure 1 (Continued): Estimates of trends in time spent with groups of individuals  
Notes: The top left panel presents estimates of  $\beta_{a,t}$  from Equation 1; 2003 is the omitted (reference) year. The basic set of controls includes a day-of-week fixed effect and a month fixed effect. “Age” is a categorical variable, describing the age of the respondent: 18-29, 30-39, 40-49, 50-59, 60-69, 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. In the other five panels, I present estimates of  $\beta_{a,g(i),t}$  with 2003 again representing the reference year. In these five panels, I apply the most extensive set of controls that were used in the top left panel. 1.96 standard-error confidence intervals are based on robust standard errors.

As Table 1 indicated, trends in time alone differ according to education, gender, race, age, and family 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. In addition, I consider whether increasing time alone reflects substitution away from time spent with individuals from the same household or away from time spent with individuals from other households. Within Equations 2 through 4, “a” is short for alone, “o” for time spent with individuals from other households, and “s” for time with individuals from the same household as the respondent:

$$x_{a,it} = \beta_{a,g(i),t} + \beta'_{a,g(i)} \mathbf{X}_{i,t} + \varepsilon_{a,it} , \quad (2)$$

$$x_{o,it} = \beta_{o,g(i),t} + \beta'_{o,g(i)} \mathbf{X}_{i,t} + \varepsilon_{o,it} , \text{ and} \quad (3)$$

$$x_{s,it} = \beta_{s,g(i),t} + \beta'_{s,g(i)} \mathbf{X}_{i,t} + \varepsilon_{s,it} . \quad (4)$$

The top right, bottom left, and bottom right panels of Figure 1 present estimates of  $\beta_{a,g(i),t}$  with  $g$  representing different demographic group categories. All regressions include controls for age, race and ethnicity, education, sex, metropolitan status, and employment status, each interacted with the group  $g$ . Between 2003 and 2019, the alone share of free time increased by 4.6 percentage points more for high school-educated than college-educated individuals; by 4.6 percentage points more for non-White individuals relative to non-Hispanic White individuals; by 2.8 percentage points more for low-income versus high-income households; by 2.1 percentage points more for males relative to females; and by 3.1 percentage points more for individuals younger than 40 years old relative to those who are older than 60. Relative to the overall amount of time that most individuals spend alone (approximately 40-50 percent of their free time; see the first row of panel B of Table 1), these differential trends are substantial.

If Americans are spending more of their time alone, with whom are they spending less time? Figure 2 presents estimates of  $\beta_{o,g(i),t}$  (in the top left and bottom left panels) and  $\beta_{s,g(i),t}$  (in the top right and bottom right panels). On average, essentially all of the increase in time spent alone is due to a reduction in the amount of time spent with individuals outside of one's household.

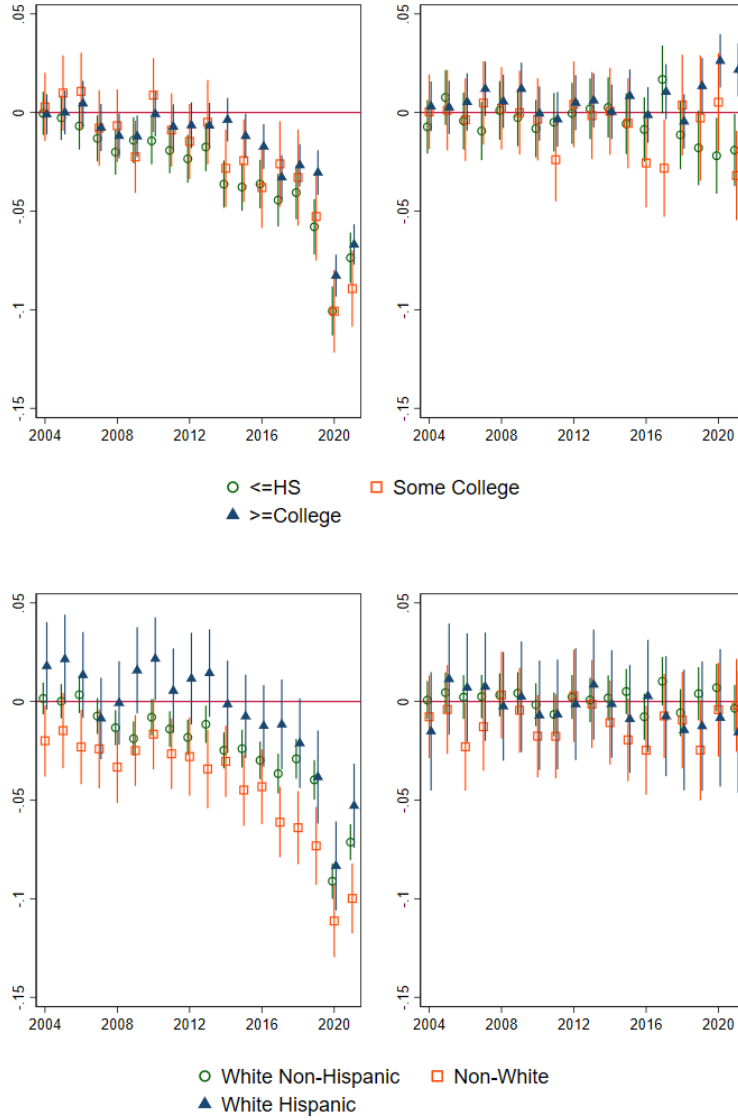


Figure 2: Estimates of trends in time spent with individuals outside and inside the household. Notes: In each panel, I plot estimates of  $\beta_{o,g(i),t}$  and  $\beta_{s,g(i),t}$  from Equations 3 and 4; 2003 is the omitted (reference) year. In the top two panels, individuals are grouped according to their educational background; in the bottom two panels, individuals are grouped according to their race and ethnicity. In the top left and bottom left plots, the dependent variable is the fraction of free time spent with individuals outside of the respondent's household; in the top right and bottom right plots, the dependent variable is the fraction of time spent with individuals from the respondent's household. See the notes for Figure 1 for the additional controls included in the regression.

However, for understanding differential growth rates in alone time across demographic groups, both time spent with others inside and outside of the household are important. Between 2003 and 2019, time spent with individuals from other households decreases by 2.6 percentage points more for high-school-or-less than for college-educated individuals. For time

spent with individuals from the same household, this differential is 2.5 percentage points. Similarly, non-Hispanic White individuals’ alone time has declined relatively less both due to smaller declines in time spent with individuals from other households and because – in contrast to other races and ethnicities – their time spent with individuals from their same household has increased.<sup>10</sup>

What activities account for increasing alone time, especially among less educated individuals, among males, and among non-White individuals? To address this question, I re-estimate Equation 2 with a new dependent variable: the share of free 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 free time spent alone pursuing leisure at home increased by 4.4 p.p. for high-school-or-less individuals (compared to 0.7 p.p. for college-educated individuals) and 4.1 p.p. for non-Hispanic White individuals (compared to 2.2 p.p. for White individuals); see the top two panels of Figure 3. 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 for those with at most high school education by 2.7 p.p. (relative to those with a college degree).<sup>11</sup> 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 3, 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 with exceptionally large decreases for those with a high school education or less, low-income households, and non-White individuals.

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<sup>10</sup>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 2.9 percentage points between 2003 and 2019 and by 5.0 percentage points between 2003 and 2021. 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.

<sup>11</sup>I do not aim to determine the direction of causality (if any) between television usage and time alone. It could be that improvements in television quality induce individuals to watch more TV, which (since it is a relatively solitary activity) leads to more alone time. Alternatively, reduced opportunities for socialization may be inducing individuals to spend a larger fraction of their free time alone.

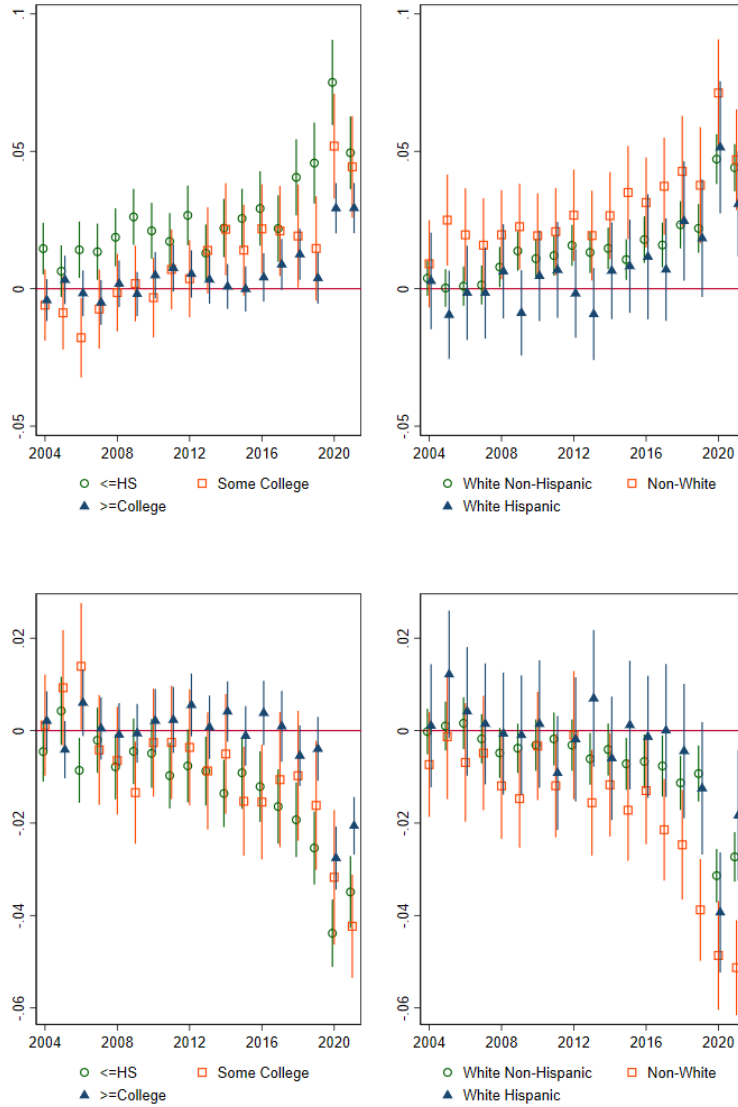


Figure 3: Estimates of trends in time spent on leisure: Home alone versus with others and out of the home

Notes: The top panels present the coefficients of year dummies on the fraction of free time that is spent on leisure at home, 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.

As time together is necessary to build and develop deep interpersonal relationships (e.g., [Roberts and Dunbar, 2011](#) and [Hall, 2019](#)), these trends 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, economists, sociologists,

and psychologists have each argued that these social ties are a key contributor to success in the labor market, to health, and to overall well-being ([Granovetter, 1973](#); [Diener and Seligmann, 2002](#); and [Holt-Lunstad et al., 2015](#)). In light of this, what do the trends presented in this section imply for inequality in well-being across households?

## 5 Implications for Well-being Inequality

In this section, I explore the implications of these trends in alone time for well-being inequality. Briefly, I present the relationship between time spent alone and subjective well-being. Then, to provide a point of comparison, I relate subjective well-being with household income. The main conclusion from this exercise is that increases in time spent alone, and differential increases in time spent alone, represent a salient deterioration of well-being, on average, and an important source of increasing 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.<sup>12</sup> 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 well-being inequality.

### 5.1 Well-being Measures

In 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”).

Regarding the first set of questions: for up to three randomly chosen activities within the survey day, respondents rated — on a scale of 0 to 6 — their happiness, tiredness,

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<sup>12</sup>[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 of [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.



sadness, pain, stress levels, and their perceived meaningfulness during the activity.<sup>13</sup> For each activity, I consider three 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; and
- the *U-index*, which is an indicator equal to 1 if the happiness measure is lower at least one of the negative emotions.

Table 2: Emotional well-being measures by activity group

	Net Affect		Happiness		U-Index		Share of Total Non-Work Time	
	No	Yes	No	Yes	No	Yes	No	Yes
Alone								
Non-Work Time	3.44	2.68	4.66	4.08	0.18	0.27	0.55	0.45
TV	3.06	2.56	4.41	4.01	0.22	0.29	0.10	0.11
Leisure At Home	3.27	2.68	4.55	4.07	0.19	0.27	0.16	0.18
Leisure Out of Home	3.99	3.31	4.97	4.46	0.12	0.20	0.10	0.02
Eating	3.81	2.97	4.83	4.22	0.12	0.23	0.09	0.03
Home Production	3.02	2.80	4.41	4.14	0.23	0.23	0.06	0.10
Childcare	3.78	3.28	4.98	4.60	0.15	0.19	0.03	0.00
Other Non-Work-Time	3.01	2.36	4.44	3.90	0.23	0.32	0.11	0.11

Notes: The sample includes the 91,230 non-work activities 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. “TV” is a component of leisure at home.

Table 2 presents summary statistics from the 2012-2013 well-being module of the ATUS. It lists average reported happiness, average net affect, and the U-index for different categories of non-work time. Among the different categories, leisure outside of the home and eating have relatively high happiness 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. For each activity category, time alone has lower happiness and net affect, and higher U-indexes. Notably, home

<sup>13</sup>See <https://www.bls.gov/tus/wbmquestionnaire.pdf> for the questionnaire; accessed October 13, 2022. These questions were also included in a 2010 ATUS well-being module. For the exercises in this section, I will restrict my analysis to the two-year period in which both measures of well-being were included in the survey.

production with others is associated with higher emotional well-being relative to leisure at home alone.

Table 3: Emotional well-being measures by activity group

	Net Affect		Unhappiness		Happiness	
Leisure at Home	0.331	0.224	-0.053	-0.025	0.123	0.100
*Not Alone	(0.032)	(0.027)	(0.005)	(0.006)	(0.022)	(0.022)
Leisure at Home	-0.248	-0.110	0.022	0.022	-0.357	-0.189
*Alone	(0.031)	(0.028)	(0.005)	(0.006)	(0.022)	(0.022)
Leisure Out of Home	1.029	0.538	-0.126	-0.053	0.545	0.351
*Not Alone	(0.035)	(0.030)	(0.006)	(0.007)	(0.024)	(0.024)
Leisure Out of Home	0.261	-0.043	-0.032	0.016	0.005	-0.043
*Alone	(0.059)	(0.046)	(0.010)	(0.010)	(0.041)	(0.037)
Eating	0.720	0.464	-0.099	-0.060	0.363	0.267
*Not Alone	(0.037)	(0.026)	(0.006)	(0.006)	(0.025)	(0.021)
Eating	-0.158	-0.043	0.012	-0.005	-0.251	-0.077
*Alone	(0.051)	(0.036)	(0.009)	(0.008)	(0.035)	(0.028)
Home Production	0.006	-0.203	-0.004	0.015	-0.031	-0.166
*Not Alone	(0.040)	(0.031)	(0.007)	(0.007)	(0.027)	(0.025)
Home Production	-0.217	-0.355	-0.003	0.032	-0.301	-0.311
*Alone	(0.035)	(0.028)	(0.006)	(0.006)	(0.024)	(0.022)
Childcare	0.731	0.499	-0.080	-0.058	0.522	0.411
*Not Alone	(0.050)	(0.040)	(0.008)	(0.009)	(0.034)	(0.032)
Childcare	0.129	0.231	-0.023	-0.025	0.122	0.185
*Alone	(0.186)	(0.123)	(0.032)	(0.027)	(0.128)	(0.099)
Other Non-Work Time	-0.699	-0.371	0.095	0.053	-0.552	-0.315
*Alone	(0.034)	(0.027)	(0.006)	(0.006)	(0.023)	(0.022)
Person Fixed Effects	No	Yes	No	Yes	No	Yes
N	91,230	90,098	91,230	90,098	91,230	90,098
Adjusted R <sup>2</sup>	0.045	0.757	0.026	0.592	0.043	0.669

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 Non-Work” activities performed not 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.

Do the differences reported in Table 2 reflect differences in the pleasurability 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 level observations, different well-being measures as the dependent variable, and activity-by-alone-status indicators as additional explanatory variables.<sup>14</sup> In some specifica-

<sup>14</sup>This regression builds on Vagni (2021). He applies the 2014-2015 United Kingdom Time Use Surveys

tions, I include person fixed effects as controls; in others I do not.<sup>15</sup> For specifications with respondent fixed effects, the coefficients on the activity-by-alone status characterize within-individual differences in subjective well-being across different groups of activities. Table 3 reports the results from this regression. As with Table 2, Table 3 indicates that time spent alone is associated with lower subjective well-being. The within-activity differences are somewhat smaller, about half as large, when person fixed effects are included. (For instance, the average net affect for leisure at home is 0.58 points higher when someone else is present according to the regression without respondent fixed effects, and 0.33 points higher in the specification with respondent fixed effects.) In sum, even holding fixed the individual respondent, activities conducted alone are less pleasurable.

In a second set of questions, survey respondents were asked about their overall life assessment, 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?*

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 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 satisfaction (as measured by the Cantril ladder) is increasing throughout the income distribution. Another contrast is, while unemployed individuals report lower life satisfaction, there is no relationship between emotional well-being and unemployment (Knabe et al., 2010).

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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 3, Vagni (2021) finds that parents’ reported enjoyment is higher in activities with their spouse and with their children.

<sup>15</sup>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 3 are similar in specifications in which these controls are omitted.

## 5.2 Implications of Time Alone for Well-being Inequality

Having discussed the two measures of well-being, I evaluate how each varies 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.

For respondents to the 2012-2013 well-being module, I compare  $c_{it}$  and  $u_{it}$  to the fraction of the respondent’s free time that is spent alone,  $x_{a,it}$ . 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, then compute the residual from each of these regressions. Call  $\tilde{c}_{it}$ ,  $\tilde{u}$ , and  $\tilde{x}_{a,it}$  the residuals from these regressions. Finally, to place the subjective well-being measures on a common scale, I divide  $\tilde{c}_{it}$  by its sample standard deviation, and call the resulting variable  $\hat{c}_{it}$ . Also let  $\hat{u}_{it}$  refer to  $\tilde{u}_{it}$  divided by its standard deviation.

The top panel of Figure 4 plots  $\hat{c}_{it}$  and  $\hat{u}_{it}$  against  $\tilde{x}_{a,it}$ , illustrating that a greater share of time alone corresponds to lower subjective well-being. According to this figure, a 5 percentage point increase in alone time – roughly the differential in 2003-2019 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.<sup>16</sup>

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<sup>16</sup>The relationships among  $c_{it}$ ,  $u_{it}$ , and  $x_{a,it}$  (without computing residuals) are similar to those presented in Figure 4. See 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 4 are robust to the inclusion of these variables as additional controls. Finally, when applying the explanatory variables employed in Figure 4 and a linear probability model, there is no conditional correlation between the two measures of physical health and the fraction of free time spent alone; see Table C.1. 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.

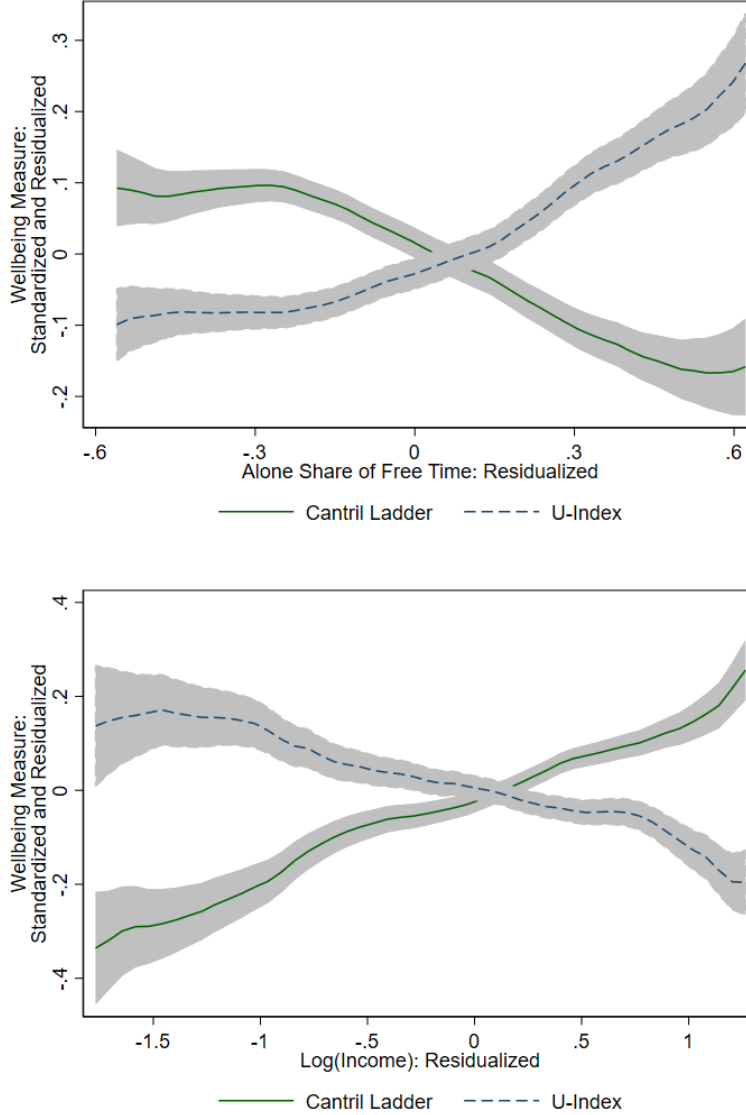


Figure 4: Relationship between well-being and alone time

Notes: To compute “Alone Share of Free Time: Residualized”,  $\tilde{x}_{a,it}$ , I first regress the share of free time that is alone 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, and race/ethnicity fixed effects. 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 fixed effects listed above. I take the residual from each of these two regressions. I “standardize” each of these two residuals by dividing by their respective standard deviations. The sample in these two regressions include only the 20,847 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 Free Time” with log household income. For readability, in producing the top panel, I omit the bottom and top one percentile of  $\tilde{x}_{a,it}$ . In producing the bottom panel, I omit the top and bottom one percentile of  $\tilde{y}_{it}$ .

Are these differences large or small? I use households' log income (call this  $y_{it}$  and its residual-on-observables  $\tilde{y}_{it}$ ) as a rough benchmark.<sup>17</sup> In particular, I seek the household income level that has the same predicted change in  $\hat{c}_{it}$  and  $\hat{u}_{it}$  as the 5 percentage point difference in  $\tilde{x}_{a,it}$ . According to the bottom panel of Figure 4, a regression of  $\hat{c}_{it}$  on  $\tilde{y}_{it}$  would yield a slope of approximately 0.17. As a result, our 5 percentage point differential in alone time has the same association with life satisfaction (measured by  $\hat{c}_{it}$ ) as a 9 log point difference in household incomes.<sup>18</sup> A similar calculation, using  $\hat{u}_{it}$  instead of  $\hat{c}_{it}$ , would indicate that a 5 percentage point differential in alone time corresponds to a 16 log point difference in household income. So, the relative increase in alone time among less educated, non-White, lower-household-income individuals indicates that 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 4 are not based on any experimental or quasi-experimental variation. Moreover, individuals' overall life satisfaction likely depends on their long run time alone. 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-satisfaction-based) well-being inequality implications of increased time alone are downward biased.<sup>19</sup> 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 has been more modest: 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), in Appendix Figure C.2 I confirm that the relationships given in Figure 4 are robust to various transformations and alternate variable definitions.

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<sup>17</sup>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 4. For the other 14 intervals, I set the income as the midpoint within each interval.

<sup>18</sup>To arrive at this number, divide 0.016 (the standard deviations of  $\hat{c}_{it}$ , corresponding to a 5 percentage point alone time differential) by 0.17 (the slope of the relationship between  $\hat{c}_{it}$  and household income).

<sup>19</sup>Frazis and Stewart (2012) are the first to make this argument in the context of measures based on the American Time Use Survey.

## 6 Conclusion

Americans increasingly spend their free time alone. These shifts are concentrated in leisure activities – with time alone and at home replacing time outside of the household and with others – and among individuals with less education and with lower household income, and those who are younger, males, and non-White individuals. 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.

While these trends in time use preceded 2020, clearly the COVID-19 pandemic resulted in a dramatic increase in time alone. As the pandemic abates, will it leave a permanent impact on how, where, and with whom Americans spend their free time? Furthermore, 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? These are exciting questions for future research.

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## A Additional Details on the Sample Construction

In certain exercises, I group activities on the basis of 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 between well-being and alone time—sensitivity analysis

Notes: In the top panel, I consider the sensitivity of the relationship between alone time and life satisfaction (according to the “Cantril ladder” measure). The baseline measure applies no transformation to the data. The “Indicator $\geq 6$ ” replaces  $c_{it}$  with  $\mathbf{I}\{c_{it}\geq 6\}$ , with analogous transformations applied for “Indicator $\geq 7$ ”, and “Indicator $\geq 8$ ”. Finally, the “Sigma=0.1” transformation replaces  $c_{it}$  with  $10\left(\frac{c_{it}}{10}\right)^{0.1}$  with an analogous transformation applied for “Sigma=10”. After performing these transformations, I apply the same residualization and standardization described in the notes of Figure 4. The bottom panel considers alternate measures of everyday emotional well-being: happiness and net affect. Net affect equals the difference between happiness and the mean of the individual’s reported pain, sadness, stress, and tiredness. In producing this plot, I omit the bottom and top one percentile of  $\tilde{x}_{a,it}$ .r 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
- *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 and 2021; heterogeneity in 2003 to 2021 trends

in time alone for male and female individuals and young and old individuals; and 2003 to 2021 trends in time with one’s spouse or partner, with one’s children, with other relatives, and with friends. Finally, I confront the hypothesis that the results presented in Section 4 solely reflect substitution of in-person for virtual socialization.

## Time Alone in 2020 and 2021

First, Table B.1 presents the share of free time spent alone for quarter within 2020 and 2021, relative to the same quarter in 2019.<sup>20</sup> (The COVID-19 pandemic interrupted data collection for nearly two months, between March 18, 2020 and May 9, 2020.) Overall, data from 2020 and 2021 suggest that alone time increased within the year by approximately 2 percentage points, with greater increases for lower- and middle-education individuals and (especially at the beginning of the pandemic) older individuals. However, there is meaningful statistical variability from quarter to quarter, clouding some of these comparisons.

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

Demographic Group	2020				2021			
	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
Entire Sample	0.010	0.001	0.026	0.036	0.032	0.017	0.023	0.002
≤High School	0.009	0.021	0.019	0.060	0.029	0.021	0.006	-0.006
Some College	0.028	0.017	0.017	0.035	0.124	0.047	0.043	0.020
≥College	0.006	-0.019	0.039	0.018	0.005	0.006	0.030	0.005
Age≤39	0.011	-0.024	0.021	0.027	0.056	0.004	0.037	0.019
Age∈[40,59]	0.000	-0.006	0.022	0.034	0.007	0.010	0.011	-0.007
Age≥60	0.021	0.032	0.036	0.045	0.027	0.033	0.016	-0.013
Low HH Income	0.033	0.011	0.034	0.026	0.049	0.020	0.024	-0.037
Medium HH Income	0.011	0.002	0.039	0.055	0.057	0.015	0.032	0.028
High HH Income	-0.010	-0.002	0.026	0.036	-0.010	0.024	0.025	0.034

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

## 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 2 in Section 4, which showed that time spent with individuals from other households declined markedly between 2003 and 2021 (while time spent with individuals from the same

<sup>20</sup>Throughout 2003-2021, there is some seasonality in the alone share, which increases each October and November by approximately 1-2 percentage points compared to December and January. Comparing time alone to the analogous quarter in 2019 attempts to account for this seasonality.

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 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 — precisely, friends or coworkers/clients/colleagues (in non-work activities) — declined considerably. At the beginning of the sample, individuals spent 10.8 percent of their free time with friends. This declined by almost half, by 5.4 percentage points, between 2003 and 2019 and then declined even further in 2020 before rebounding in 2021.

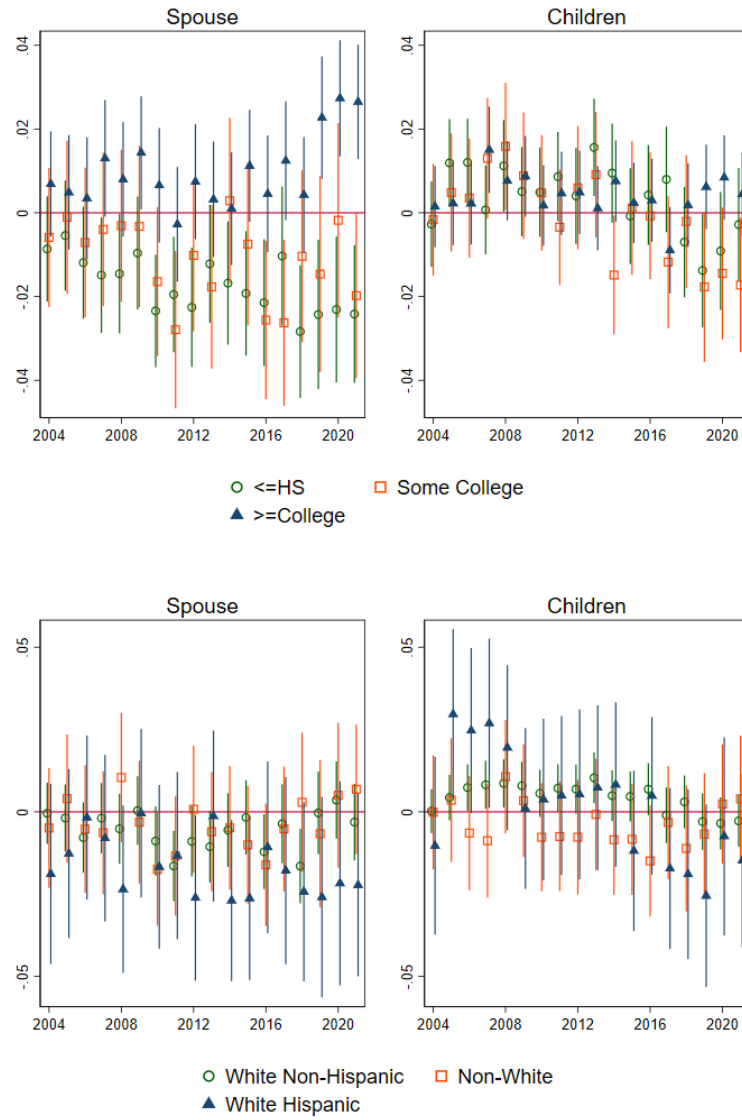


Figure B.1: Estimates of trends in time spent with groups of individuals

Notes: See the notes for Figure 1 for the list of controls and footnote 6 for the definition of time spent with friends, or time spent with other relations.



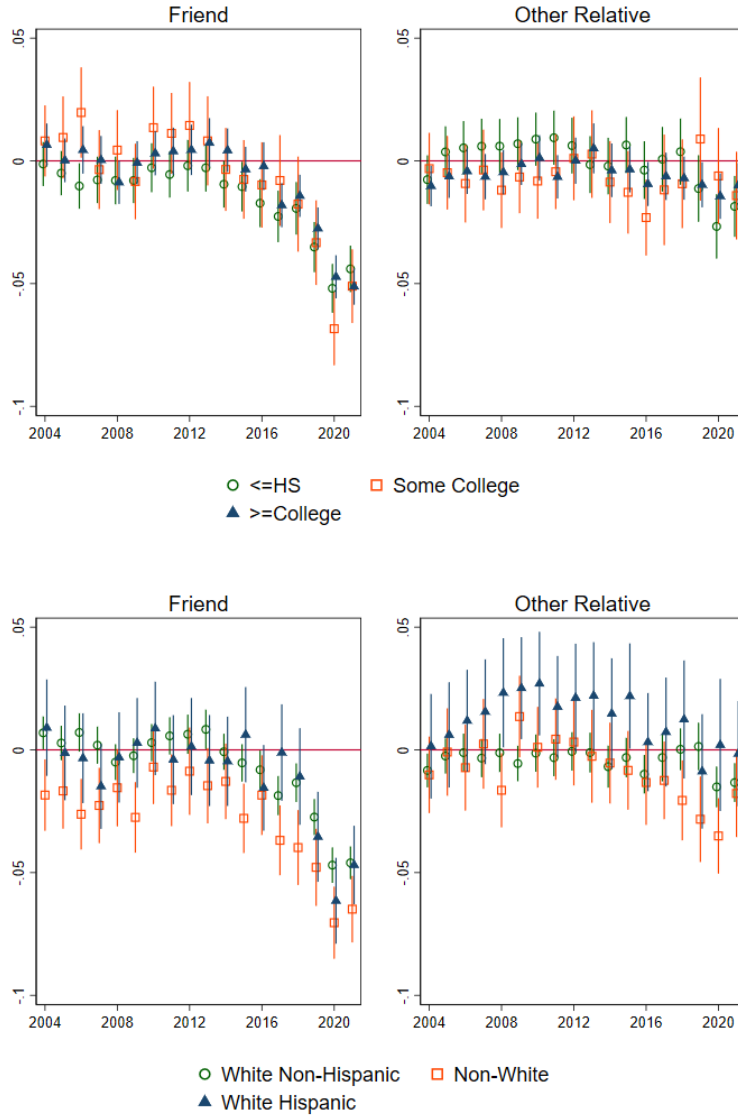


Figure B.2: Estimates of trends in time spent with groups of individuals

Notes: See the notes for Figure 1 for the list of controls and footnote 6 for the definition of time spent with spouses/partners or time spent with children.

### Substitution of In-Person for Virtual Socialization

Finally, in Figure B.3 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). While not in close physical proximity, individuals may potentially 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, the measures used in this paper may be overstating the decline in social isolation experienced during the sample period.<sup>21</sup>

First, between 2003 and 2019, I find no trend in the amount of time individuals are alone and answering e-mails, on the computer, or on the telephone (top panels of Figure B.3). Compared to White individuals, non-White individuals may be increasingly alone and engaged in these activities over the 2003 to 2019. However, these differences are modest and reversed between 2019 and 2021.

In the next four panels of Figure B.3, 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 on-line with other individuals, they may conceivably represent a form of virtual socialization.) The amount of time spent alone and playing games increased by approximately 0.8 percentage points between 2003 and 2019, and an additional 0.4 percentage points between 2019 and 2021. However, in contrast to the results presented in Section 4, there is no systematic increase in time spent alone while playing games between individuals with at most a high school degree and college-educated individuals, or across different ethnic and racial groups. (Moreover, un-plotted, there are no significant differences in 2003 to 2021 trends in the amount of time spent alone while playing games between individuals from high-income, middle-income, and low-income households.)

On the other hand, as the bottom two panels of Figure B.3 indicate, the amount of time that individuals spend alone and playing games has increased considerably more for younger individuals and for males.

In sum, it seems as if a small but meaningful portion of the increase in measured time alone can be accounted by substitution of physical for virtual socialization. While it does not appear that this substitution occurred differentially according to individuals race and ethnicity, household income, or education, it does appear that younger and male individuals were increasingly more likely to play games while alone.

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<sup>21</sup>To what extent does on-line gaming in particular, or virtual socialization in general, provide the emotional support afforded by traditional social relationships? First, consider the 725 individual-activity observations within the 2012-2013 observations 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, net affect is higher when gaming with others versus alone — 3.84 vs. 3.27 — and similar when on the computer with others versus alone — 3.00 vs 2.94 — and when writing e-mails with others versus alone — 2.76 vs 2.79. Second, 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 highlight the pro-social and psychologically beneficial possibilities of playing video games with others. In sum, while there is not a consensus on the subject, video games and online social media provide an imperfect at best substitute for in-person interactions.

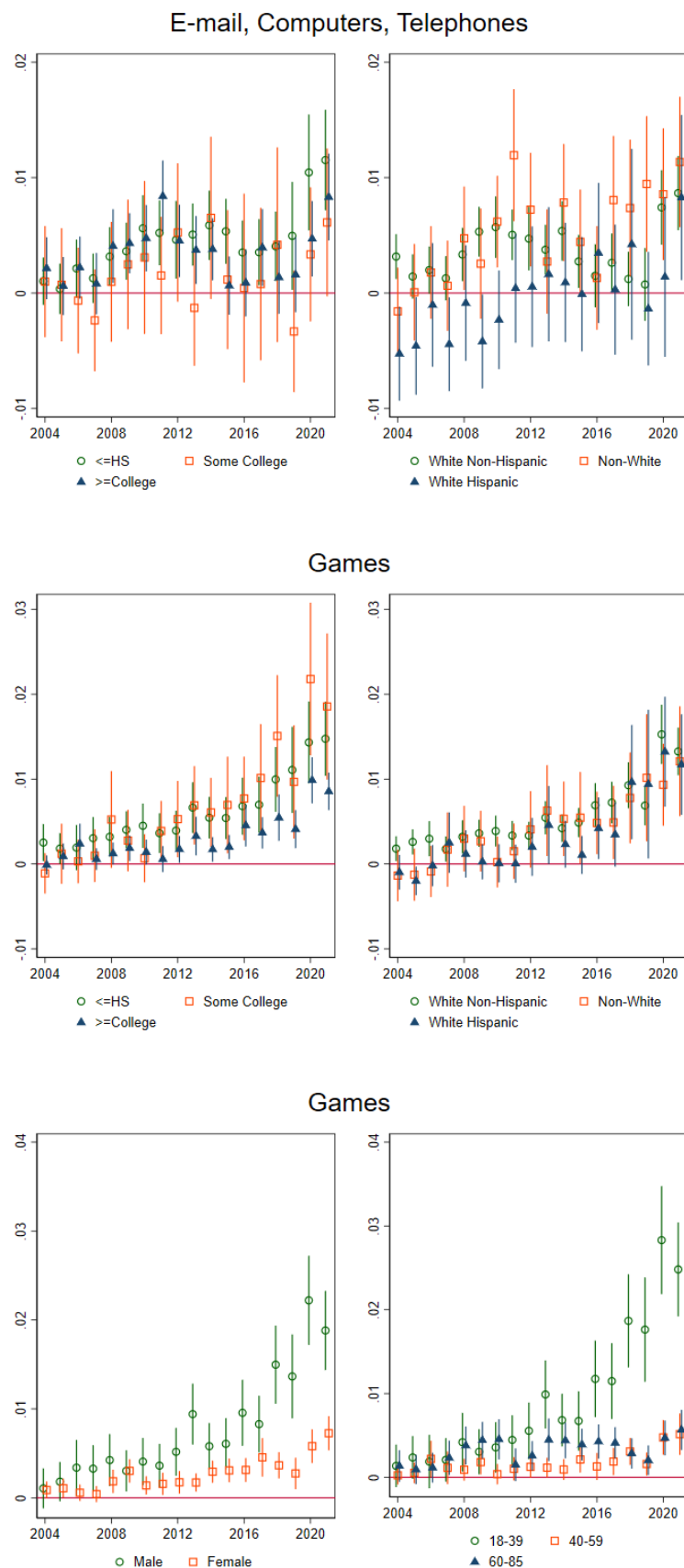


Figure B.3: Estimates of trends in time spent alone in “virtual” activities  
 Notes: See the notes for Figure 1 for the list of controls.

## C Analysis Supplementing Section 5

This appendix compiles additional figures and tables supplementing those in Section 5. I first present the relationship between health measures in the well-being module to time spent alone. Then, I reproduce Figure 4 (a) without controlling for demographic characteristics and (b) by applying alternate measures of subjective well-being.

In Table C.1, I consider whether measures of health are related to those of time spent alone. I regress two measures that are recorded in the 2010, 2012, and 2013 well-being modules in which individuals are asked whether they took pain medication 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 outcomes and the share of free time spent alone as an explanatory variable. I also include the other controls applied in Figure 4. There is no statistically significant relationship between the fraction of time spent alone and high blood pressure. Time spent alone and pain medication is marginally statistically significant, with a greater fraction of time alone slightly negatively related to taking pain medication. This negative relationship is inconsistent with alone time simply serving as a stand-in or predictor for the already-well-documented rise of deaths of despair (Case and Deaton, 2015, 2017).

Table C.1: High blood pressure, pain medication, and alone time

	High BP	Pain Medication
Alone Share of Free Time	-0.005 (0.011)	-0.020 (0.011)
Age: 30-39	0.086 (0.007)	0.049 (0.010)
Age: 40-49	0.197 (0.009)	0.118 (0.011)
Age: 50-59	0.338 (0.010)	0.191 (0.011)
Age: 60-69	0.457 (0.011)	0.197 (0.013)
Age: 70-85	0.486 (0.013)	0.195 (0.014)
Non-White	0.075 (0.008)	-0.048 (0.008)
White Hispanic	-0.018 (0.008)	-0.046 (0.010)
Some College Educ.	-0.020 (0.008)	-0.007 (0.009)
College Education	-0.056 (0.007)	-0.042 (0.007)
Log HH Size	-0.034 (0.006)	-0.031 (0.007)
Employed, Absent	0.040 (0.019)	0.081 (0.021)
Unemployed, On Layoff	-0.005 (0.038)	0.003 (0.039)
Unemployed, Looking	0.026 (0.012)	0.018 (0.014)
Not in Labor Force	0.078 (0.008)	0.116 (0.009)
N	33,149	33,149
Adjusted R <sup>2</sup>	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 free time as an explanatory variable, and the other controls used in Figure 4 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 less; the omitted category for race/ethnicity includes White non-Hispanic individuals; the omitted category for education includes those with high school education or less; the omitted category for employment includes those who are employed and at work.

Figure 4 presents conditional correlations between subjective well-being measures, time spent alone, and log household income, conditioning on the day of the week the survey was taken, year (whether the survey year was 2012 or 2013), sex, education, race and ethnicity, employment and metropolitan status, log household size, and age. Figure C.1 reproduces these relationships without these controls. The relationships are nearly identical.

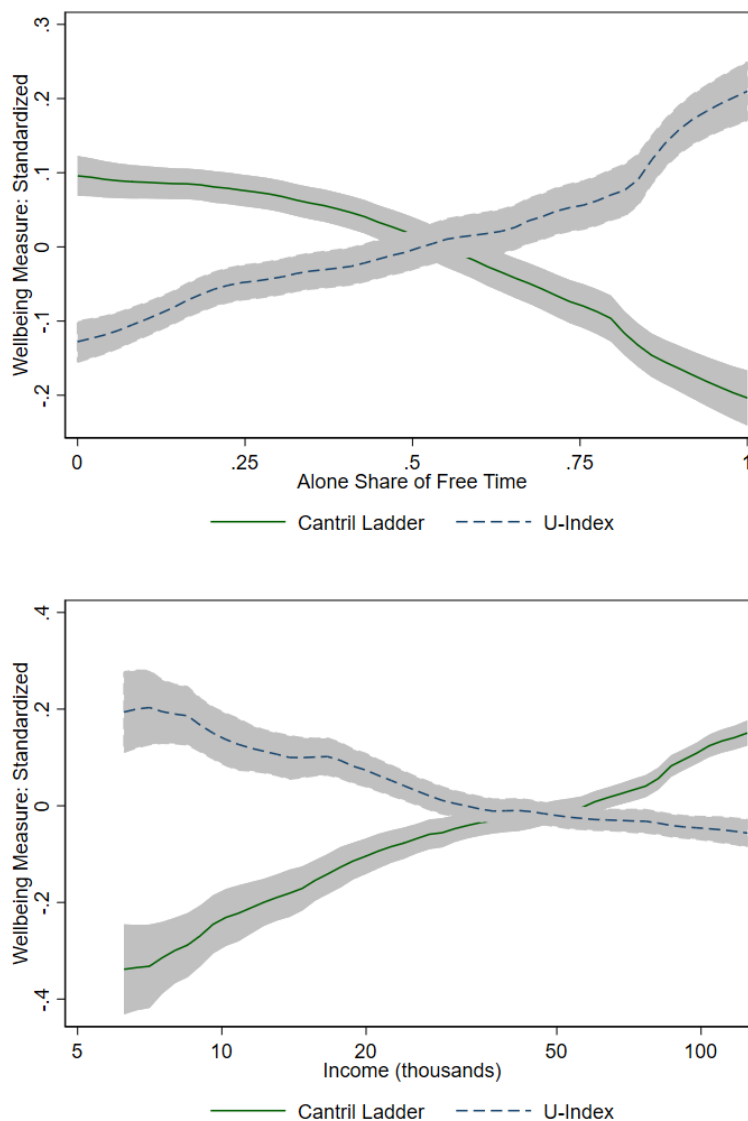


Figure C.1: Relationship between well-being and alone time—sensitivity analysis

Notes: See the notes for Figure 4. In contrast to that figure, I do not apply the regression-then-take-residual procedure described in that caption. Also in contrast to Figure 4, I do not omit the 1st and 99th percentile of the alone time distribution.

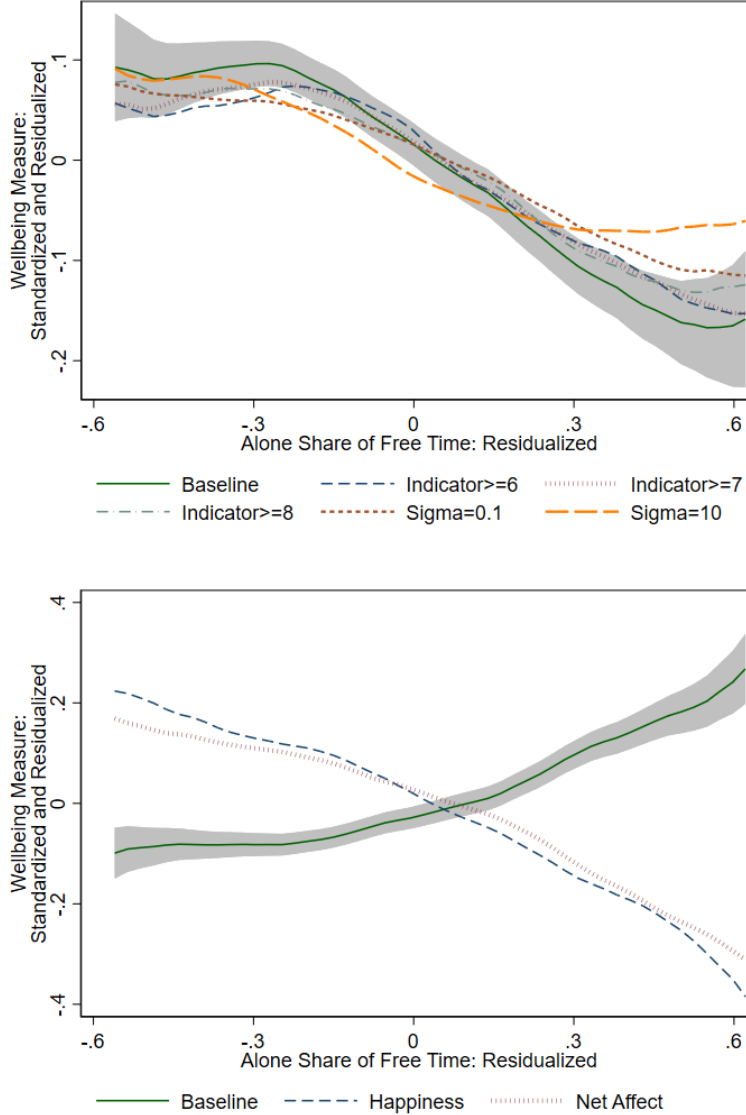


Figure C.2: Relationship between well-being and alone time—sensitivity analysis

Notes: In the top panel, I consider the sensitivity of the relationship between alone time and life satisfaction (according to the “Cantril ladder” measure). The baseline measure applies no transformation to the data. The “Indicator $\geq 6$ ” replaces  $c_{it}$  with  $\mathbf{I}\{c_{it} \geq 6\}$ , with analogous transformations applied for “Indicator $\geq 7$ ”, and “Indicator $\geq 8$ ”. Finally, the “Sigma=0.1” transformation replaces  $c_{it}$  with  $10 \left(\frac{c_{it}}{10}\right)^{0.1}$ , with an analogous transformation applied for “Sigma=10”. After performing these transformations, I apply the same residualization and standardization described in the notes of Figure 4. The bottom panel considers alternate measures of everyday emotional well-being: happiness and net affect. Net affect equals the difference between happiness and the mean of the individual’s reported pain, sadness, stress, and tiredness.

Finally, Figure C.2 assesses the sensitivity of Figure 4 to transformation of the Cantril ladder measure and alternate definitions of emotional well-being. First, I replace  $c_{it}$  with

various indicators:  $\mathbf{I}\{c_{it} \geq 6\}$ ,  $\mathbf{I}\{c_{it} \geq 7\}$ , and  $\mathbf{I}\{c_{it} \geq 8\}$ .<sup>22</sup> 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  $\sigma$  below 0.1 or above 10 to be extreme and implausible.) For each of these five transformations, I compute the conditional relationship between the transformed  $c_{it}$  and the fraction of free time spent alone (conditioning on the same set of controls applied in Figure 4). The  $10 \left(\frac{c_{it}}{10}\right)^{10}$  transformation results in a weaker relationship with  $\tilde{x}_{a,it}$  for above-median values of  $\tilde{x}_{a,it}$ ; the  $\mathbf{I}\{c_{it} \geq 6\}$  transformation results in a weaker relationship with  $\tilde{x}_{a,it}$  for below-median values of  $\tilde{x}_{a,it}$ . However, across all five transformations, life satisfaction is significantly negatively related to time spent alone.

In the bottom panel of Figure C.2, I consider two alternate measures of emotional well-being: the average happiness reported in the activities within the respondent’s time diary, and the net affect (defined as the difference between the positive and negative emotions). Except for the fact that the U-index is a measure of low emotional well-being, while the other two variables provide a measure of high well-being, the three measures paint a consistent relationship of the relationship between well-being and time alone.

## 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 1965-1966, 1975-1976, 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 and contrast the trends documented in the paper — covering 2003 to 2021 — 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 2021. 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 2021. 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 2021 period.

Within the existing literature, Sevilla et al. (2012) provide the definitive analysis of time spent with others in the 1965 to 2003 period.<sup>23</sup> As much as possible, even if it means

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<sup>22</sup>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 cut-offs around 6, 7, and 8 surround the center of the life satisfaction distribution.

<sup>23</sup>I thank Jose Ignacio Gimenez-Nadal and Almudena Sevilla for generously sharing the code related to their 2012 paper.



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 — 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, is increasingly spent while concurrently undertaking a non-leisure activity, and is increasingly fragmented. Furthermore, the decline in the quality of leisure is most severe for individuals 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.”<sup>24</sup> This definition excludes volunteer activities, gardening, and pet care.<sup>25</sup> Since the 1965-1966 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 (a) with the individual’s spouse, (b) with an adult,<sup>26</sup> or (c) alone.<sup>27</sup> In addition to these measures I compute the share of non-work, non-sleep, non-personal care time that is spent alone.<sup>28</sup> 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](#)

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<sup>24</sup>[Sevilla et al. \(2012\)](#) also employ surveys from the 1985 and 1992-1994. 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.

<sup>25</sup>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](https://www.ahtusdata.org/ahtus-action/variables/MAIN#codes_section); accessed October 13, 2022.

<sup>26</sup>Time with an adult includes time with (i) the individual’s spouse, (ii) a well-known adult, or (iii) another household adult.

<sup>27</sup>[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.

<sup>28</sup>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).

et al. (2012), building on Egerton et al. (2005), carefully document the following differences across the surveys. Whereas the 1975-1976 and 2003 samples aim to represent the national adult population, the 1965-1966 sample aims to capture the working-age population. Furthermore, approximately two-fifths of the sample frame of the 1965-1966 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 were conducted at different points within the year: The 1965-1966 sample draws only on individuals sampled in November-May; the 1975-1976 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 years from year to year.<sup>29</sup> Given these differences, as best as one can, Sevilla 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 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 1975-1976 sample. This concurrence is re-assuring, especially since the AHTUS has periodically been revised since Sevilla et al. (2012) was published.<sup>30</sup>

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<sup>29</sup>For instance, according to the the AHTUS documentation file, in the 1965-1966 and 1975-1976 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](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).

<sup>30</sup>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

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 11-12 percentage points higher in the 2003 sample than in the 1965 sample. The corresponding difference for females was 5 percentage points. The increase was of similar magnitude for individuals with and without college education.

As previously mentioned, the 1965-1966 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 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 percentage points 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 percentage points. 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 a single metro area — one which 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 upward biased depiction of national trends in time spent alone, where this bias may be greater for individuals with less education.

Holding these concerns to the side 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:

$$x_{\theta,it} = \beta_t + \gamma_t \cdot \text{Education}_{it} + \alpha'_e \mathbf{X}_{i,t} + \varepsilon_{it}, \text{ for } \theta \in \{s, o, a\}. \quad (5)$$

Within this equation,  $\text{Education}_{it}$  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  $\alpha_e$  are allowed to vary according to the

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

Panel A: All Years		(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Sample	Sex	Educ.	Leisure This Paper	SGG (2012)	Share w/ Spouse This Paper	Share with Spouse SGG (2012)	Share with Adults This Paper	Share with Adults SGG (2012)	Free Time
1965-1966	M	Low	29.28	29.29	0.609	0.592	0.749	0.744	0.301
1975-1976	M	Low	31.19	27.90	0.607	0.602	0.714	0.713	0.331
2003	M	Low	34.96	35.75	0.557	0.542	0.615	0.612	0.424
2018	M	Low	35.31		0.591		0.497		0.503
1965-1966	M	High	25.90	25.94	0.530	0.517	0.684	0.691	0.333
1975-1976	M	High	29.78	26.01	0.586	0.592	0.694	0.678	0.359
2003	M	High	31.23	32.13	0.541	0.523	0.581	0.587	0.455
2018	M	High	32.00		0.579		0.533		0.483
1965-1966	F	Low	27.33	27.35	0.470	0.458	0.698	0.688	0.376
1975-1976	F	Low	33.35	33.05	0.514	0.444	0.718	0.685	0.327
2003	F	Low	32.26	33.02	0.503	0.491	0.637	0.627	0.388
2018	F	Low	32.39		0.485		0.553		0.444
1965-1966	F	High	26.48	26.55	0.412	0.405	0.646	0.659	0.399
1975-1976	F	High	30.05	27.54	0.459	0.476	0.663	0.658	0.346
2003	F	High	28.98	29.31	0.507	0.498	0.608	0.603	0.410
2018	F	High	27.55		0.543		0.568		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 1965-66, 1975-1976, 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. Free 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.

educational status of the individual (whether the individual has any college education or not.) The coefficients of interest are  $\beta_t$  and  $\gamma_t$ . The former describes overall changes in time allocation relative to 1965; the latter characterize 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.<sup>31</sup> The final four columns estimate Equation 5 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 considerably, by 5-7 percentage points, 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 or less.

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 1965-1966 sample. This section’s final exercise explores whether these differences are salient for assessing trends beginning in 1965. To do so, I amend Equation 5 regression as follows:

$$x_{\theta,i\tau} = \beta_{\tau} + \gamma_{\tau} \cdot \text{Education}_{i\tau} + \alpha_e \mathbf{X}_{i,\tau} + \varepsilon_{i\tau}, \text{ for } \theta \in \{s, o, a\}. \quad (6)$$

In Equation 6,  $\tau$  indexes a survey sample for survey waves beginning in 1975-1976. For the 1965-1966 wave,  $\tau$  has distinct values for the Jackson, MI subsample and the national subsample. In my estimation of Equation 6, the omitted category includes individuals surveyed in the national subsample within the 1965-1966 wave. As a result, estimates of  $\beta_{\tau}$  and  $\gamma_{\tau}$  each permit comparison among (i) national samples across the survey years, as well as (ii) the two different subsamples within the 1965-1966 wave. To emphasize, I choose the national subsample within the 1965-1966 wave as the omitted group — and not the Jackson, MI subsample — to facilitate like-for-like comparisons across years.

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<sup>31</sup>Reading across columns (1) through (4) of Table D.2, the corresponding estimates of  $\beta_{2003}$  in Table 2 of Sevilla et al. (2012) are, respectively, -0.060, -0.105, 0.027, and -0.047. The corresponding estimate of  $\gamma_{2003}$  are 0.062, 0.038, 0.054, and -0.002, respectively.

Table D.2: Estimates of Equation 5

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Spouse	Adults	Spouse	Adults	Spouse	Adults	Alone	Alone
$\beta_{1975}$	-0.010 (0.024)	-0.027 (0.019)	0.047 (0.019)	0.022 (0.015)	0.020 (0.015)	-0.001 (0.012)	0.008 (0.012)	-0.016 (0.008)
$\beta_{2003}$	-0.055 (0.019)	-0.112 (0.016)	0.035 (0.018)	-0.055 (0.014)	-0.008 (0.013)	-0.083 (0.011)	0.069 (0.010)	0.053 (0.007)
$\gamma_{1975}$	0.062 (0.040)	0.068 (0.034)	-0.017 (0.039)	-0.025 (0.032)	0.024 (0.028)	0.025 (0.023)	-0.008 (0.022)	-0.003 (0.015)
$\gamma_{2003}$	0.069 (0.033)	0.042 (0.028)	0.056 (0.032)	0.015 (0.027)	0.057 (0.023)	0.030 (0.019)	-0.011 (0.019)	-0.002 (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	5670	7711	6491	9769	12,161	17,480	17,480	17,993
Adjusted R <sup>2</sup>	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  $\beta_t$  and  $\gamma_t$  as defined in Equation 5. The omitted education group includes individuals with no college education. The omitted year includes individuals surveyed in 1965-1966, 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.

Table D.3 presents estimates of Equation 6. 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 1965-1966 wave. Concomitantly, estimates of the 1965 to 2003 growth in time alone are meaningfully smaller: 3.5 to 4 percentage points in Table D.3 relative to 5 to 7 percentage points 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 percentage points more for highly educated than less educated individuals, the analogous estimate from Table D.3 is 4.1 percentage points. The corresponding gaps between estimates of  $\gamma_{2003}$  in columns (6) through (8) are also roughly 2 percentage points.

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 time alone increases have 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 ( $\approx 9.2 - 3.7$ ) percentage points between 2003 and 2018, with increases slower by 3.6 ( $\approx -2.3 - 1.3$ ) percentage points for individuals with at least some college education.

Table D.3: Estimates of Equation 6

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Spouse	Adults	Spouse	Adults	Spouse	Adults	Alone	Alone
$\beta_{1965, \text{Jackson}}$	0.084 (0.031)	0.074 (0.026)	0.053 (0.029)	0.077 (0.023)	0.070 (0.021)	0.078 (0.017)	-0.075 (0.017)	-0.035 (0.012)
$\beta_{1975}$	0.029 (0.029)	0.009 (0.024)	0.068 (0.023)	0.052 (0.019)	0.050 (0.018)	0.032 (0.015)	-0.023 (0.015)	-0.031 (0.010)
$\beta_{2003}$	-0.016 (0.025)	-0.076 (0.021)	0.056 (0.022)	-0.025 (0.018)	0.022 (0.017)	-0.049 (0.014)	0.036 (0.013)	0.037 (0.009)
$\beta_{2018}$	0.021 (0.031)	-0.181 (0.026)	0.035 (0.030)	-0.091 (0.023)	0.031 (0.022)	-0.136 (0.017)	0.114 (0.017)	0.092 (0.012)
$\gamma_{1965, \text{Jackson}}$	-0.052 (0.067)	0.000 (0.054)	0.023 (0.062)	-0.025 (0.050)	-0.018 (0.046)	-0.016 (0.037)	0.047 (0.036)	0.033 (0.024)
$\gamma_{1975}$	0.030 (0.046)	0.054 (0.039)	-0.018 (0.044)	-0.039 (0.037)	0.007 (0.032)	0.011 (0.027)	0.014 (0.026)	0.010 (0.017)
$\gamma_{2003}$	0.040 (0.040)	0.028 (0.035)	0.056 (0.039)	-0.001 (0.033)	0.041 (0.028)	0.014 (0.024)	0.013 (0.023)	0.013 (0.015)
$\gamma_{2018}$	0.044 (0.045)	0.089 (0.038)	0.119 (0.045)	0.037 (0.037)	0.075 (0.032)	0.064 (0.026)	-0.051 (0.025)	-0.023 (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	7180	10,158	8150	12,627	15,330	22,785	22,785	23,477
Adjusted R <sup>2</sup>	0.023	0.116	0.047	0.120	0.037	0.116	0.111	0.191

Notes: The table presents coefficients estimates, and corresponding robust standard errors, of  $\beta_\tau$  and  $\gamma_\tau$  as defined in Equation 6;  $\beta_{1965, \text{Jackson}}$  and  $\gamma_{1965, \text{Jackson}}$  compare the Jackson, MI subsample to the national subsample of the 1965-1966 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 1965-1966, 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.

In sum, between 1965 and 2003 the fraction of time that Americans spend with adults has declined, while the share of their time that they spend alone has 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 (a) the particular measure of with whom the respondent is spending his time and on (b) whether one includes respondents from Jackson, MI in the 1965-1966 sample. In contrast, since 2003, trends that vary across education groups are robust to the measure applied.