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The Rise of Work from Home and its Impact on Job Satisfaction

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Remote Work Conference 2026 · Hoover Institution | Stanford University · October 29, 2026

Motivation

- The COVID-19 pandemic induced a sharp expansion of working from home (WFH)

- Prior research finds WFH to be a highly valued amenity (Barrero et al., 2021; Aksoy et al., 2022; Bloom et al., 2024)

- Existing evidence comes from experimental case studies of specific firms and from self-reports or elicitations of willingness-to-pay for WFH from non-probability sampled internet surveys.

This paper

Data. Annual surveys on WFH (2021–2023) and biennial surveys on satisfaction (2015–2024) in a nationally representative, probability-based panel (the **Understanding America Study**, UAS)

Three separate approaches to answer the question:

- **1. Willingness to pay.** Discrete choice experiments for additional days of WFH
- **2. Pooled OLS and individual fixed effects.** Job satisfaction and WFH status
- **3. Pandemic-induced shift to WFH.** Comparison of post-pandemic change in satisfaction between workers in WFH-amenable vs. non-amenable jobs at pandemic onset (diff-in-diff)

Data: Understanding America Study (UAS)

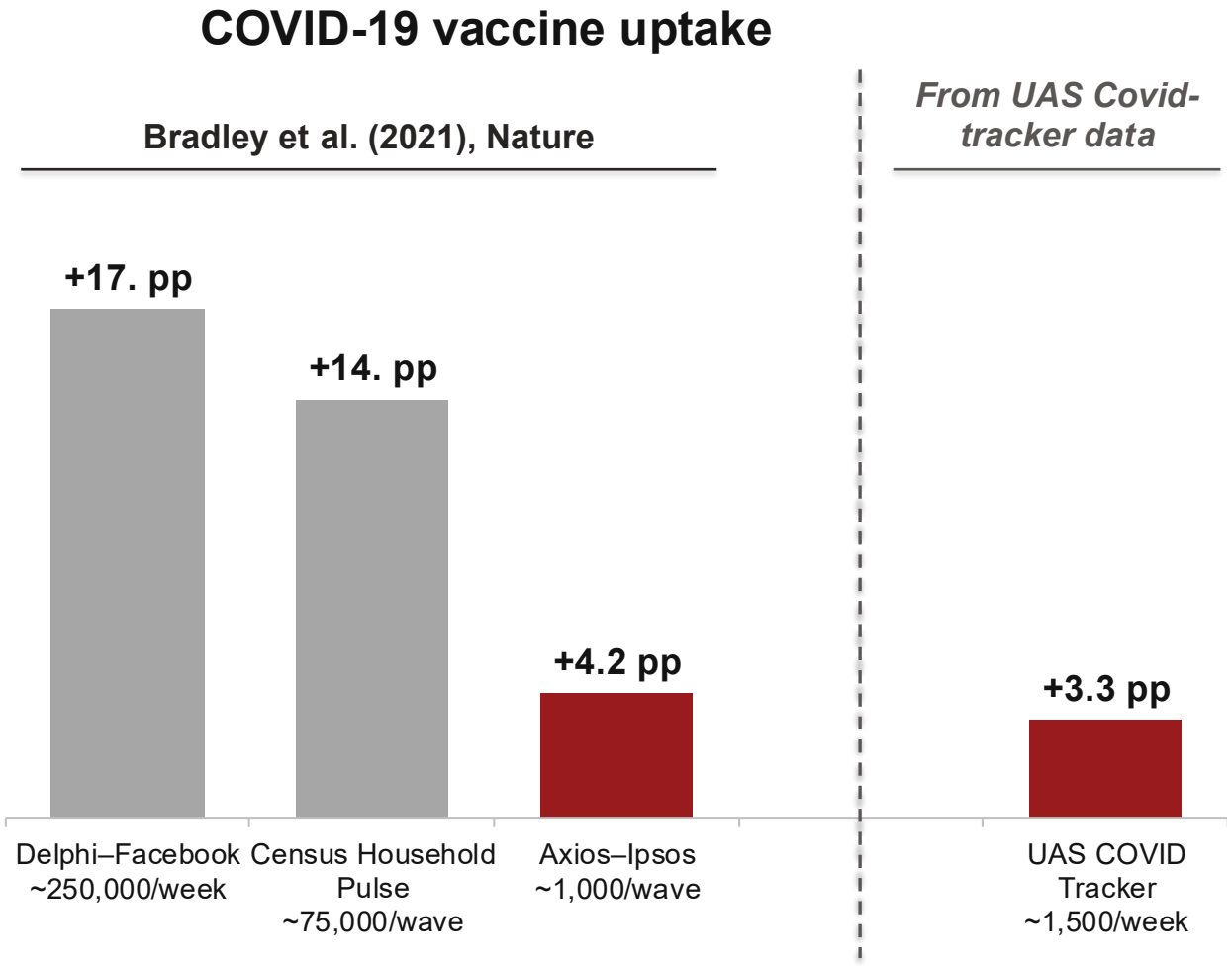
- **Probability-based.** Recruited from the list of all U.S. postal addresses; ~15,00 panel members
  - Those without Internet access receive a tablet, training, and an Internet connection
- **Longitudinal.** Same individuals followed over time
- **Work-from-Home Survey.** Fielded to the entire panel in 2021, 2022, and 2023
  - 7,430 / 8,422 / 7,975 respondents; response rates 76%–85%
- **UAS core surveys.** Biennial since 2015: satisfaction with job and daily activities before, during, and after the pandemic

Comparison of the UAS with the SWAA Internet panels

	UAS (this paper)	SWAA (Barrero, Bloom & Davis)
Recruitment	Address-based probability sample of U.S. households (probability panel)	Commercial survey providers via panel aggregators (opt-in, non-probability)
Internet access	Tablet and connection provided if needed	Existing Internet users only
Who is surveyed	All panel members; we use all workers	Working-age, prior-year earnings ≥ $10,000 ($20,000 before Apr 2021)
Design	Longitudinal panel: same people over time	Monthly survey waves
Period covered	Job satisfaction and other core measures every two years, 2015–present (we use through 2024) WFH Survey yearly, 2021–2023	Monthly since May 2020 (ongoing)
Adjustment	Raked to CPS by gender, race/ethnicity, age, education, Census region	Reweighted to CPS by age, sex, education, earnings

When sampling matters

- **Benchmarks (Yeager et al., 2011).** Probability samples beat 7 opt-in panels on 19 benchmarks, even after weighting: error 3.3–3.5 vs. 4.9–9.9 pp
- **Hard-to-reach groups (Pew, 2023).** Opt-in error ~3× larger for ages 18–29 and Hispanics (11 vs. 3.6 pp)
- **Bogus respondents (Pew, 2024).** Matter most for hard-to-reach groups: in opt-in samples, 24% of Hispanics and 12% of under-30s claim a license to operate a nuclear submarine
- **Vaccine uptake (chart).** Big non-probability surveys overstated uptake by 14–17 pp; probability panels (Axios–Ipsos, UAS) by 3–4 pp



Probability-based panel (address-based recruitment)

Not a probability panel

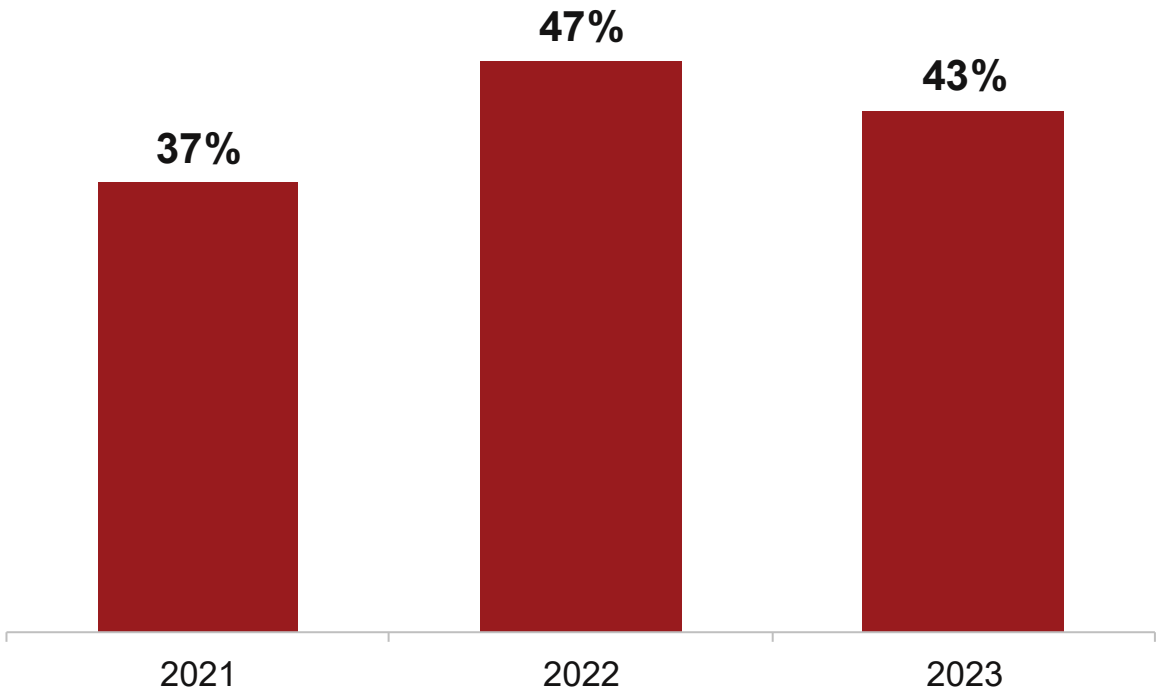
Overestimate of the share of U.S. adults with at least one dose relative to the CDC benchmark of May 15, 2021. Delphi–Facebook (week ending May 8), Household Pulse (wave ending May 10), Axios–Ipsos (May 7–10): Bradley et al. (2021), Nature. UAS: 7-day estimate for May 4–10, 62.7% vs. CDC 59.4% (our calculation).

Results

Measures of WFH-amenability and preferences

- **WFH-amenable.** “Consider your current job. Are you able to do that job from home at least partially?” Example given: a bartender cannot; an administrative assistant in an office can, at least partially. About half of workers say yes.
- **Preferred WFH days.** “How often would you like to work from home, whether you think you will be able to or not?”
- **Allowed WFH days.** Days per week over the next three months; asked of workers with WFH-amenable jobs.

WFH-amenable workers who want more WFH days than their employer allows



% of workers with WFH-amenable jobs; excludes those who do not know their employer’s plans. Source: Section II.D of the paper.

1. Willingness to pay for WFH

Stated-preference elicitation

Willingness to pay elicitation

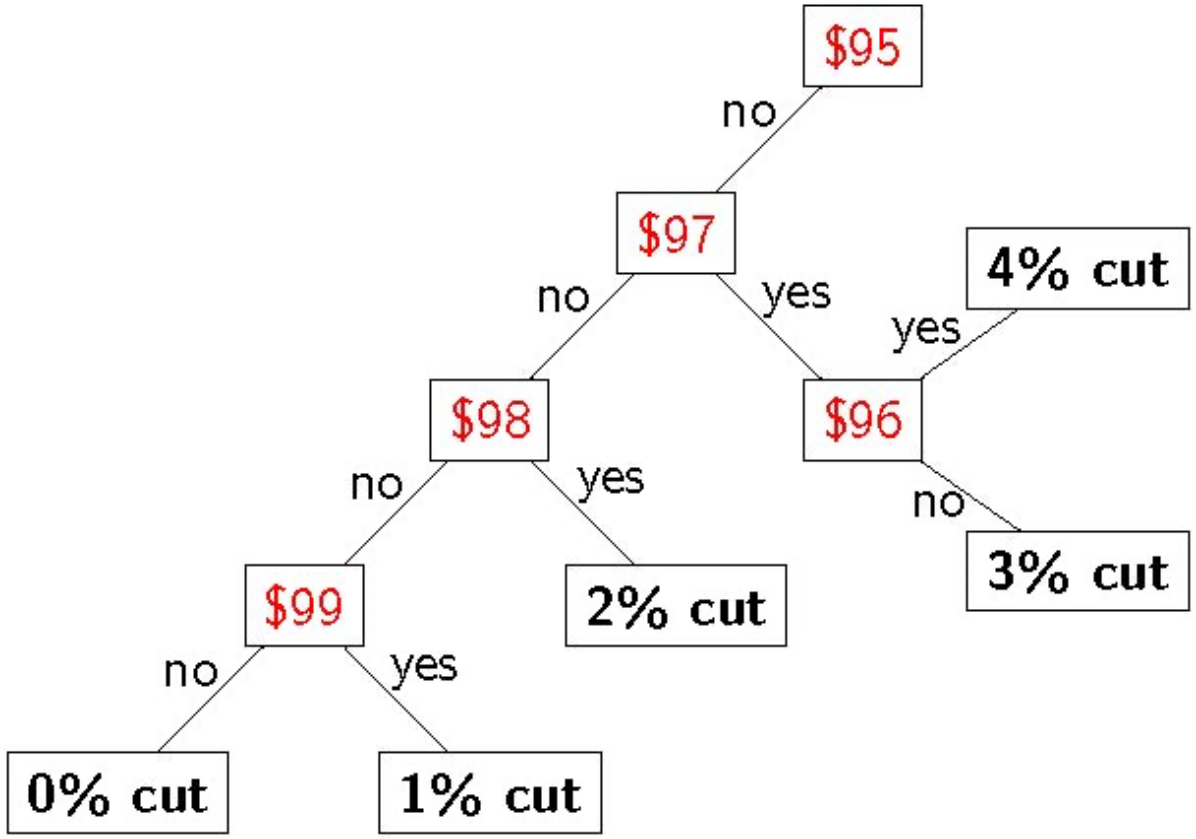
- We use previously elicited worker's pay and how often they are paid (per day, week, two weeks, month…)
- **Who is asked.** Workers with WFH-amenable jobs who want at least as many WFH days as their employer allows
- **The question.** We describe a job just like theirs, but with lower pay and one more day of WFH:

> *"Would you accept a job that pays* **[95% of your pay]** *per* **[pay period]** *but allows you to work from home one more day per week? Would you take it instead of your current job?"*

Pay and pay period are each worker's own; the offer starts at a 5% cut and moves up or down with each answer (next slide).

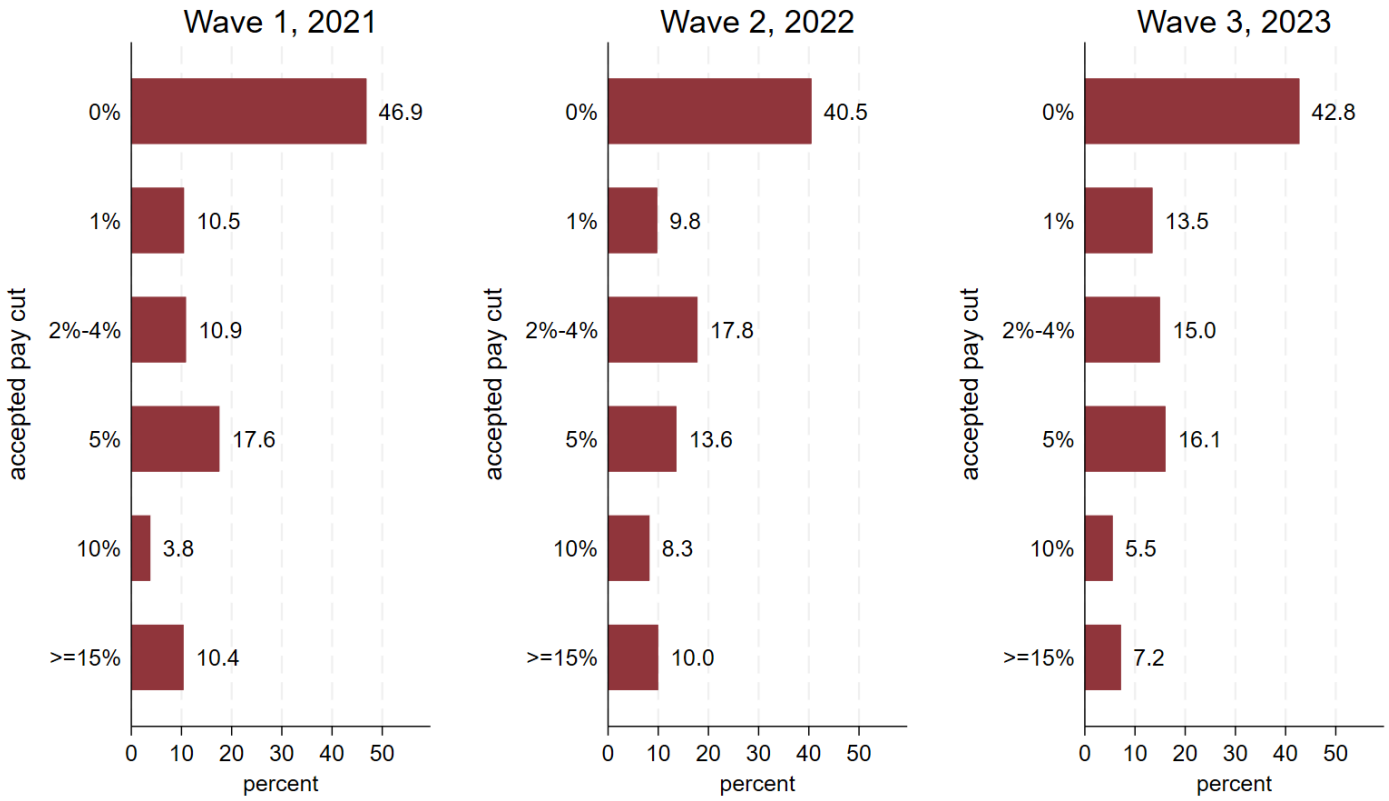
Willingness to pay elicitation: an example

- Worker earns $100/day; prefers 3 WFH days, employer allows 1
- Accept $95 (5% cut) for one more WFH day?
- Sequence of accept–reject questions until switch
- Yields interval-censored WTP



Willingness to pay for an additional day of WFH

- Almost half of workers would give up a non-negligible share of pay
- On average, ~3.5% of current wage
- WTP increases with commute time; higher among women, and lower among workers 50+



Workers with WFH-amenable jobs whose preferred number of WFH days ≥ days allowed by employer.

2. WFH arrangements and job satisfaction

Pooled OLS and fixed-effects regressions

Empirical strategy: WFH and job satisfaction (pooled OLS)

- **Outcome.** Job satisfaction (1–5), Work-from-Home Survey 2021–2023, standardized
- **WFH status (key regressor).** Two alternative measures:
  - **Model I.** Number of WFH days per week allowed by the employer
  - **Model II.** Preferred vs. allowed WFH days: pref = allowed, pref < allowed (omitted: pref > allowed)
- **Controls.** Z_i (time-invariant) and X_{it} (time-varying), defined below

Pooled OLS: $$JobSat5_{it} = \alpha + \beta\ WFHstatus_{it} + \gamma\ Z_i + \delta\ X_{it} + \tau_t + \varepsilon_{it}$$

Z_i: gender, race/ethnicity, education

X_{it}: age, marital status, region; earnings, commute time; job benefits

Controls enter in three steps: individual level controls (demographics, education, etc.); + earnings and commute time; + job benefits.

Workers allowed to WFH report higher job satisfaction

- **Outcome.** Job satisfaction, 1 (very dissatisfied) to 5 (very satisfied), standardized
- **Days of WFH.** each day allowed: +0.02–0.03 SD (≈ +0.02–0.04 points on the 1–5 scale)

	OLS	OLS	OLS
Controls	Demog.	+ Earnings, commute	+ Benefits
Model I: Number of WFH days allowed	0.03***	0.02***	0.02***
N (individuals)	5,159	5,159	5,159

*Dependent variable: standardized job satisfaction (JobSat5). In Model II, the omitted group is WFH pref > allowed. Standard errors clustered at the individual level (see Table 2 in the paper). *** p<0.01, ** p<0.05, * p<0.1.*

Empirical strategy: WFH and job satisfaction (fixed effects)

- **Outcome.** Job satisfaction (1–5), Work-from-Home Survey 2021–2023, standardized
- **WFH status (key regressor).** Two alternative measures:
  - **Model I.** Number of WFH days per week allowed by the employer
  - **Model II.** Preferred vs. allowed WFH days: pref = allowed, pref < allowed (omitted: pref > allowed)
- **Controls.** Individual fixed effect α_i; X_{it} (time-varying controls): job characteristics, earnings, benefits

Fixed effects: $JobSat5_{it} = \alpha_i + \beta\ WFHstatus_{it} + \delta\ X_{it} + \tau_t + \varepsilon_{it}$

X_{it}: marital status, region; earnings, commute time; job benefits

Fixed effects use only within-worker changes in WFH status. Robustness: workers who did not change job or employer.

Workers allowed to WFH report higher job satisfaction

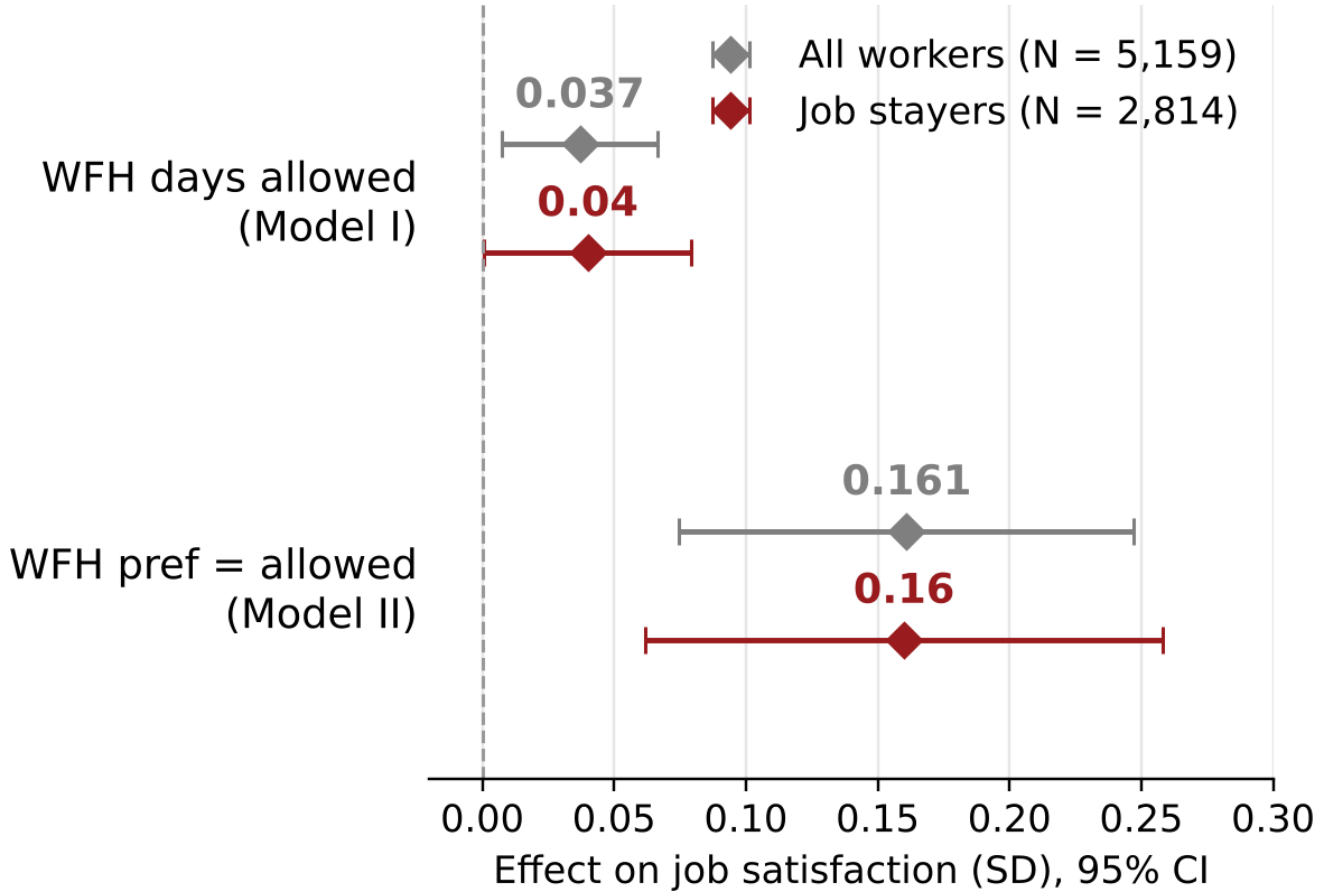
- **Outcome.** Job satisfaction, 1 (very dissatisfied) to 5 (very satisfied), standardized
- **Days of WFH.** each day allowed: +0.035–0.037 SD (≈ +0.04 points on the 1–5 scale)

	FE	FE	FE
Controls	Demog.	+ Earnings, commute	+ Benefits
Model I: Number of WFH days allowed	0.037**	0.036**	0.035**
N	5,159	5,159	5,159

Dependent variable: standardized job satisfaction (JobSat5). In Model II, the omitted group is WFH pref > allowed. Standard errors clustered at the individual level

Robustness: workers who did not change job or employer

- Re-estimate fixed effects on workers who changed neither job nor employer
- Estimates are essentially unchanged



Fixed-effects regressions with demographic controls (specification 1). All workers: Appendix Tables A5, A7; job stayers: Table 3 (job changes reported retrospectively in wave 3). Movers-only estimates are not reported in the paper.

3. The pandemic-induced shift to remote work

Intent-to-treat: WFH-amenable job at pandemic onset

Empirical strategy

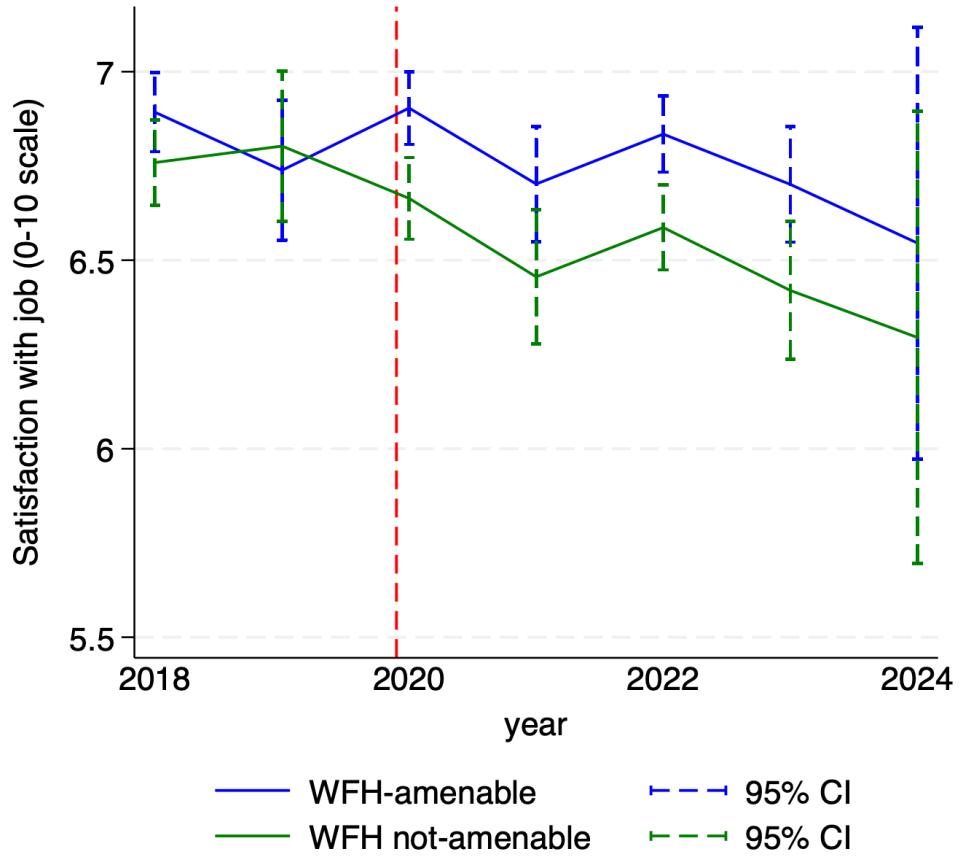
- **Treatment.** Workers whose jobs were WFH-amenable **at pandemic onset**
- **Control.** Workers whose jobs were not WFH-amenable **at pandemic onset**
- **Outcome.** Satisfaction with job and daily activities (0–10), UAS core surveys 2015–2024

$$JobSat10_{it} = \alpha_i + Post_t + \beta\,(WFHamenable_i \times Post_t) + \delta\,(Demo_i \times Post_t) + \varepsilon_{it}$$

A1. Absent the pandemic-induced shift to WFH, trends in job satisfaction would have been the same for workers with and without WFH-amenable jobs.

Satisfaction by WFH-amenability at pandemic onset

- A persistent gap opens up after the start of the pandemic
- It remains substantial by 2024



UAS core surveys. Raw (unstandardized) 0–10 scale. Red dashed line: pandemic onset.

Pandemic shift in WFH: pre-post

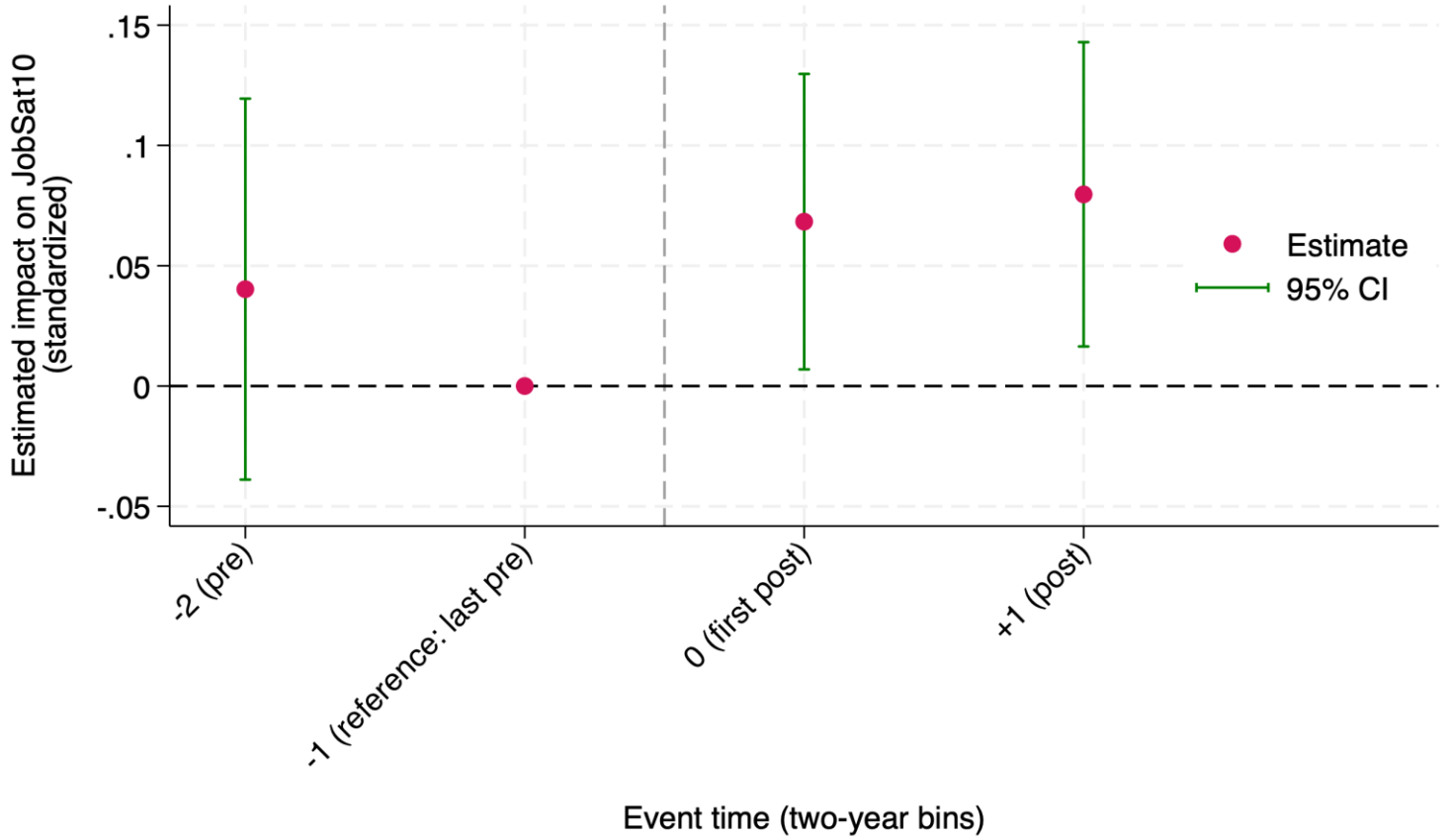
- **Outcome.** Satisfaction with job and daily activities, 0 (not at all) to 10 (completely), standardized
- **Effect.** WFH-amenable × Post: +0.06–0.07 SD (≈ +0.14–0.17 points on the 0–10 scale)

WFH-amenable job at pandemic onset ×	**(1)**	**(2)**	**(3)**	**(4)**	**(5)**
Specification I: Pre-Post					
Post	0.06** *(≈0.14 pts)*	0.06** *(≈0.14 pts)*	0.06** *(≈0.14 pts)*	0.07** *(≈0.17 pts)*	0.07** *(≈0.17 pts)*
Controls (× Post)	None	Age, gender	+ Race, education	+ Earnings, hhd income	+ Occupation
Individuals	18,879	18,879	18,875	13,734	13,734

*Individual fixed-effects regressions. Dependent variable: satisfaction with job and daily activities, standardized; in parentheses, the equivalent in points on the original 0–10 scale (SD = 2.36). Standard errors clustered at the individual level (Table 4 in the paper). ** p<0.05, * p<0.1.*

Event study and pre-trends

- No significant pre-pandemic difference
- Satisfaction increases after onset and remains elevated
- Placebo pandemic dates: no significant effects



Omitted category: final pre-pandemic two-year period. 95% confidence intervals (Figure 4).

Heterogeneity (exploratory) and robustness

	Women	Men	Under 50	Over 50
WFH-amenable × Post	0.10*	0.01	0.09	0.02

Women under 50 (N = 4,108): WFH-amenable × Post = 0.05 (SE 0.10); × number of children = 0.03 (SE 0.08), not significant.

- **Proxy for amenability.** Worked from home ≥1 day in 2019: 0.07 SD
- **Per additional day of WFH.** ITT and IV both imply ~0.07 SD; lower bound 0.04 SD

*Individual fixed-effects regressions (Table 5 in the paper). ** p<0.05, * p<0.1.*

The implied effect of an additional day of WFH

- **Days of WFH.** WFH-amenable workers: ~1 day/week in 2019 (retrospective) → ~2 days/week post-pandemic
  - The pandemic shift ≈ one additional day of remote work per week if we believe the retrospective measure (but "telescoping bias" suggests over-estimation)
  - Alternative (for bounding), assume zero days of WFH pre-pandemic

- **IV.** Days worked from home, instrumented with Post × WFH-amenable
  - One additional day of WFH: ~0.07 SD (≈0.17 points on the 0–10 scale)
  - Assuming zero pre-pandemic WFH: ~0.04 SD (≈0.09 points on the 0–10 scale; lower bound)

Smaller sample because it requires retrospective 2019 WFH days: first-stage F-statistics 2.5–9.1 . We interpret it as a benchmark for magnitude rather than a precise causal estimate.

Magnitudes are roughly consistent across methods

Method	Outcome (standardized)	Estimate *(≈ points on original scale)*	Per day of WFH *(≈ points on original scale)*
Pooled OLS (Table 2)	Job satisfaction (1–5)	0.02–0.03 SD per day allowed *≈ 0.02–0.04 points (1–5)*	0.02–0.03 SD *≈ 0.02–0.04 points (1–5)*
Individual fixed effects (Table 2)	Job satisfaction (1–5)	0.04 SD per day allowed *≈ 0.05 points (1–5)*	~0.04 SD *≈ 0.05 points (1–5)*
ITT: pandemic shift (Table 4)	Satisfaction with job/daily activities (0–10)	0.06–0.07 SD *≈ 0.14–0.17 points (0–10)*	0.07 SD (1 day pre-pandemic)* *≈ 0.17 points (0–10)* ** If no pre-pandemic WFH:* 0.03–0.04 SD (≈ 0.07–0.09 points), about half

Estimates are not directly comparable (different outcomes and samples). ITT per-day conversions assume the entire effect operates through days of WFH and are illustrative only (Section VI). Points: 1 SD ≈ 2.36 points on the 0–10 scale (Section II); ≈ 1.2 points on the 1–5 scale (implied by the paper's conversions in Section IV).

How large are these effects?

Benchmarking the estimates

- Comparison to Bloom et al. (2024). Hybrid (2 days/week) RCT: +0.35 points on a 0–10 job satisfaction scale; our IV estimate implies ~0.16 points per day on the same scale, i.e., +0.32 for two days

- Comparison to coefficients for covariates. The ITT coefficient is about one-fifth of the college-degree coefficient, simila to being White, and about one-quarter of being 50+

Implications for inequality

- College–non-college earnings gap declined by ~4 percentage points, 2019–2023
- But access to WFH expanded disproportionately among more educated workers
  - 69% of workers with a bachelor's degree held WFH-amenable jobs vs. 23% without
  - College-educated workers gained 0.46 more WFH days per week
- The imputed value of WFH offsets roughly 75% of the reduction in the college–non-college earnings gap during this period

Conclusions

- Key results from experimental case studies of WFH are also evident in nationally representative data
- Across multiple strategies, access to WFH is associated with higher job satisfaction, with no evidence that its value has diminished over time
- The pandemic-era expansion of WFH contributed to widening disparities in job satisfaction across workers
- Further work:
  - Is there convergence in 2024-2026?
  - AI and WFH
  - Implications for workers with disabilities that difficult transportation

Thank you

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We gratefully acknowledge financial support from the National Institute on Aging under grant U01AG054580.