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The growth and collapse of autonomy at work

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Humans hate being monitored. Autonomy is prized—including by research scientists. Yet little is known about a fundamental issue in the modern world: What is happening to job autonomy in today's workplaces as people move from youth on to middle age and then on to older ages? It would be natural to believe that individuals in the second half of their careers would be the senior ones with high autonomy. We provide evidence that such a belief is wrong. This study uses longitudinal data on hundreds of thousands of randomly sampled individuals, in three rich countries, who are followed through their working lives (n > 400,000). Workers' *feelings of job autonomy* trace out a smooth concave parabola, increasing up to midlife, until approximately the surprisingly early age of 40, and then collapsing over the ensuing twenty to 30 y of a person's working life. This is apparently not an illusion. We show that *objective measures of autonomy*—signified by managerial and supervisory job titles, for example—behave in a matching, hump-shaped way. As a further check, consistent qualitative evidence is given: a survey we ran asking managers about their experiences. We believe this paper's results represent a foundational, essentially unknown, and intrinsically cross-disciplinary puzzle.

autonomy | work | wellbeing | labor market | intrinsic motivation

Significance

Human beings want autonomy. This study offers longitudinal multicountry evidence (for Australia, Germany, the United Kingdom, and England) on how people feel as they go through their working lives. Job autonomy peaks early and then collapses. From the age of approximately 40 y old, the typical worker endures diminishing feelings of autonomy through the next three decades of their career. Evidence on objective measures of autonomy—including job titles—suggests that these feelings are not an emotional illusion. Perceptions and reality match: "Demotions," whether formal or informal, are apparently commonplace. The fact that autonomy exhibits this pattern in the modern workplace is, to our knowledge, not known by social and behavioral scientists.

In his famous work Human Universals (1), the anthropologist Donald E. Brown lists autonomy as one of the most basic human needs. A different and complementary style of research—using statistical methods—has found that autonomy is greatly valued by human beings in the workplace and that job autonomy fosters "intrinsic motivation" (2–8). As (9) puts it, "forget flexibility: your employees want autonomy". At the time of writing, it appears that self-motivation and independence may come to matter even more in a working-from-home future world (9).

This research area is important. It connects to long-discussed issues of self-determination theory, work design and incentives, optimal monitoring of employees, the foundations of psychological well-being, the nature of employment and decision-making in today's society, and the potential contributions to productivity and prosperity of allowing employees to have latitude in their workplace (10–19). Such topics have been studied widely across the social and behavioral sciences.

Here, we examine autonomy in cross-national longitudinal samples of workers. The paper's main contribution on the modern life cycle of autonomy and seniority is, to our knowledge, unknown. Perhaps for data reasons, what might be called the internal dynamics of people's lives in the labor market have been perplexingly rarely documented.

Later analysis is principally empirical. It is not able to explain all the patterns found. However, one way to interpret later results will be that early demotions and generalized "sidelining" are today commonplace. By contrast, a famous early article by Baker et al. (20), which looked at 20 y of data on a single company in the 1970s, for example, helped to begin a conventional wisdom—one that persists—that demotions are extremely rare. Promotions, by contrast, have been intensively considered by researchers (for example, refs. 21 and 22). A little-known historical perspective, nevertheless, comes from (23), which examines information on the Great Eastern Railway Company in the late 1880s. The author argues that demotions were consciously used by the railway company.

Despite the paucity of earlier longitudinal research, one previous research article stands out as creative, little-noticed, and potentially seminal. Innovative data records on corporations are used in work by Belzil and Bognanno (24). It is closest in spirit—although not in detailed approach or its focus—to the ideas proposed later in this paper. The authors' study, which appears to have been curiously little-cited by researchers, analyzes a proprietary panel dataset containing information on approximately 25,000 executives per year working at a sample of large US firms from 1981 to late 1988. The paper's focus is on wage growth, and the authors' sample provides information on executives appearing in at least two consecutive years, although the sample can contain up to eight observations per individual. The firms participated in a compensation survey that was administered annually. Unusually, the researchers know the specific seniority level of the individuals as judged

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by the reporting levels of each individual. The business executives in the study range from the CEO (level 1) to those as far as 11 reporting levels beneath the CEO (level 12). Promotions and demotions are defined in the study as changes in reporting level.

For the purposes of the current paper, which also uses longitudinal data but of a much broader kind, the key aspect of (24) is that the authors concluded that demotions were common. As might be expected, most executives remained at the same level in the subsequent year they were observed. However, promotions were, the researchers found, only fractionally more frequent than demotions. Promotions occurred in 13% of subsequent years and demotions in 12%. Typically, both promotions and demotions were of one level, even though multilevel transitions did sometimes take place. As the authors ultimately state: "The theoretical work on careers in organizations has paid little attention to demotions and lateral movements …. This may be unwarranted because demotions have been documented in … case studies and strongly appear in our data." Despite the impressive dataset, and the iconoclastic conclusions, the paper remains less known than does the early Baker et al. article on just a single company from the 1970s.

Another of the rare prior papers is (25). Again, this article is important but less widely known than we believe appropriate (it also has rarely been cited). A key passage states: "Our sample of executives is drawn from Execucomp….We define demotion as where an executive decreases her rank in the next period… Of the 125,589 observations, we define 10,778 as promotions and 3,933 as demotions...The vast majority of sample promotions (95 percent) and demotions (94 percent) are within rather than between firms."

A parallel labor-market fact, about wage trajectories, may be relevant. Recent work (13, 26, 27) provides evidence of broadly hump-shaped earnings through life in the modern world, although there has been debate over whether, as Bhuller et al. (27) find in panel data for Norway, earnings fall very significantly at older ages (from, unusually in the literature, approximately as early as the age of 40 for noncollege graduates and somewhat later for graduates: their Fig. 1).

It should be recorded here that one recent approach that is related to the current analysis is that of the working paper by Deming (13). His analysis does not measure autonomy in a way that is straightforwardly comparable to ours. He focuses instead on the nature of decision-making in a workplace, and uses the definition: "I create the decision-making variable using the key words and phrases "decision-making", "problem-solving", "diagnosing", "judgment", "strategize", "planning", "prioritizing", "goals", and "project management" plus closely related word stems." We thank a reviewer for bringing this to our attention. Deming analyzes data on these measures of decision-making and on earnings profiles. His work is not a study of age-profiles for autonomy, but it does examine decision-making proxies by level of job experience and offers interesting evidence that in the United States "since 1960 … the peak age of earnings has shifted from the late 30s to the mid-50s", which might suggest the potential hypothesis that profiles of various kinds in the industrialized world could be shifting rightward through time.

Simple cross-sectional work on autonomy and age has occasionally been done. An early article (8) examined pooled cross-national data on autonomy by using workers' answers to a question about whether they feel they can work independently. Modern research on related topics includes (28–30).

However, it can be argued that cross-sections cannot reliably inform us about true aging patterns (for cohort-effect reasons, among others).

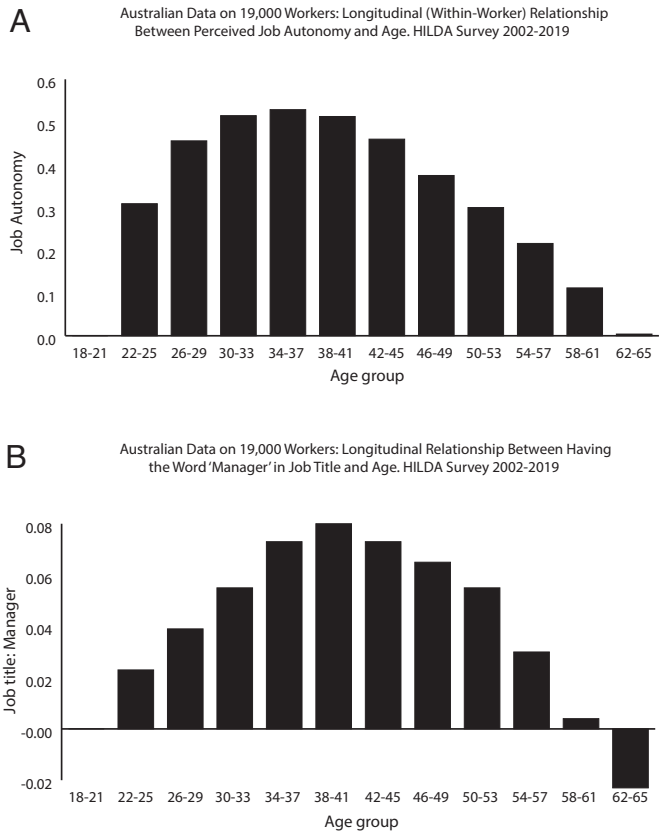

Fig. 1. (*A*) Australian Data on 19,000 Workers: Longitudinal (Within-Worker) Relationship Between Perceived Job Autonomy and Age. HILDA Survey 2002 to 2019. Notes: This and later figures depict the rise and fall of autonomy through life: Longitudinal (within-worker) relationship between job autonomy and worker age in the HILDA Survey, Australia, 2002 to 2019. The vertical bars represent the estimated coefficients from fixed-effects regression model 3 reported in *SI Appendix*, Table SA1. Number of workers followed through time: n = 19,313. Total number of observations: N = 118,701. Respondents assigned an integer value between (1) "strongly disagree" and (7) "strongly agree" to each statement: i) *I have a lot of freedom to decide how I do my own work*; ii) *I have a lot of freedom to decide when I do my work*; iii) *I have a lot of say about what happens on my job*. Averaged responses to the three statements form a combined Job Autonomy measure that lies in the (1, 7) interval. The youngest age group (18 to 21) is the base reference category. Analyzed sample is restricted to individual workers aged between 18 and 65, working between 20 and 120 h per week. Year dummies control for each of the 18 survey years. Industry dummies control for 19 different industry sectors. (*B*) Australian Data on 19,000 Workers: Longitudinal Relationship Between Having the Word "Manager" in Job Title and Age. HILDA Survey 2002-2019. Notes: Longitudinal (within-worker) relationship between having the word Manager in job title and worker age in the HILDA Survey, Australia, 2002 to 2019. The vertical bars represent the estimated coefficients (marginal effects) from the fixed-effects regression in the second column of *SI Appendix*, Table SA2. These marginal effects capture percentage-point changes from baseline. The dependent variable *Job title: Manager* equals 1 if the worker has the word Manager in their job title, and 0 otherwise. The sample mean for *Job title: Manager* is 0.15, with a SD of 0.35. Number of workers: n = 19,313. Total number of observations: N = 118,701. The youngest age group (18 to 21) is the base reference category. Analyzed sample is restricted to individual workers aged between 18 and 65, working between 20 and 120 h per week. Year dummies control for each of the 18 survey years. Industry dummies control for 19 different industry sectors.

Results

None of the previous studies have been able to pursue the kind of analysis in the current study. The paper lays out different forms of evidence showing that

i. Feelings of job autonomy rise, and then, at what might be thought the perplexingly premature age of approximately 40, decline sharply thereafter.
ii. The old do not have high autonomy.

iii. There is a close match between subjective feelings data and objective measures of autonomy.

The regression-equation results, for three of the world's rich nations, and using four random-sample panel datasets (explained in *Materials and Methods*), are captured in elementary visual form in Figs. 1–4. These patterns come from fixed-effect equations.

Fig. 1*A* is one example. The diagram, which in this case is for Australia, plots the estimated longitudinal relationship between the level of job autonomy (as perceived by the worker) and the worker's age. It depicts, for a large sample of employees as they grow older, the lifetime shape of the representative individual's job autonomy, which here is represented cardinally on the vertical axis (the conclusions are not affected by using instead an ordered probit equation or equivalent).

It may be useful to emphasize that this curved pattern is not being forced on to the data. By entering separate age dummies, it is possible in a nonparametric way to ensure that no particular polynomial assumptions were made at the outset.

Details of the underlying fixed-effect regression equations are given in the *SI Appendix*. The dependent variable, in this country's case, averages across a set of questions about each worker's perceived freedom to act; the wording of the questions is given in the footnotes of Fig. 1*A*. Fig. 1*A* is genuinely "within-worker," in standard terminology. It is not a cross-sectional pattern. The data in this case are for 2002 to 2019, thereby deliberately stopping before the Covid pandemic years (our key results are not affected by including those years, however).

Figs. 2*A*, 3*A*, and 4*A*, move to other nations. They depict almost the same pattern. Fig. 2*A* is for the United Kingdom and is for the period 2012 to 2018 (thus also stopping before Covid). Here, we have a slightly larger sample of approximately 29,000 individuals. Fig. 3*A* is the curved shape for Germany. For this nation, it is necessary to use the autonomy measure as decided by the original survey team in Germany. Fig. 4*A*, for older individuals alone, is different but complementary and consistent in character. It shows the later-life pattern for English workers. All three of the dark bars in the histogram are in the negative quadrant, although here monotonicity does not quite hold.

These Figures adjust for simple influences on workers. The underlying equations control for person fixed-effects, year fixed-effects, and industry fixed-effects. Nevertheless, we have found that adjustment for a large number of sometimes-endogenous personal variables, like education and gender, makes little difference to the shape.

However, are people's perceptions (about their autonomy) actually accurate? Might the numbers exaggerate the true loss of autonomy in later working life—when, as we had expected as our empirical study began, it would be presumed that the older bosses would typically be in charge of everyone in a workplace. Recent work (31) discovers that older workers prefer jobs with greater autonomy, so those employees might conceivably be setting a higher bar, in their own minds, for what counts as high autonomy at work.

An appropriate research question, then, is how dependent this empirical up-and-down of autonomy is on workers' purely subjective judgments rather on than their objective situation (though one could make the argument that what matters, especially in their subsequent chosen actions, is people's feelings). To assess this, it is necessary to see whether some equivalent curved form holds for the "objective" consequence of aging upon autonomy. Figs. 1*B*–4*B* report results. It can be seen that the same concave pattern is found again. Objective measures of autonomy, as captured by formal managerial and supervisory positions and titles, thus seem to trace out approximately the same ascent and descent as found in

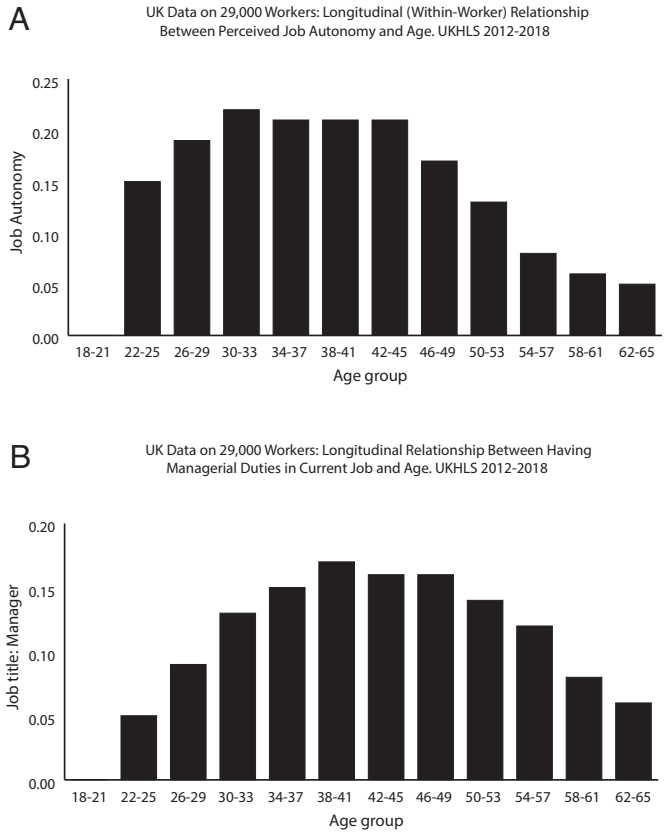

Fig. 2. (*A*) UK Data on 29,000 Workers: Longitudinal (Within-Worker) Relationship Between Perceived Job Autonomy and Age. UKHLS 2012-2018. *Notes*: Longitudinal (within-worker) relationship between job autonomy and worker age in the UKHLS, United Kingdom, 2012 to 2018. The vertical bars represent the estimated coefficients from fixed-effects regression model 3 reported in *SI Appendix*, Table *SU*1. Number of workers: n = 28,985. Total number of observations: N = 63,686. Respondents assigned an integer value between 1) "None"; 2) "A little"; 3) "Some"; 4) "A lot" to each statement i) *Have autonomy over job tasks*; ii) *Have autonomy over work pace*; iii) *Have autonomy over work manner*; iv) *Have autonomy over task order*; and v) *Have autonomy over work hours*. Averaged responses to the three statements form a combined Job Autonomy measure that lies in the (1, 4) interval. The youngest age group (18 to 21) is the base reference category. Analyzed sample is restricted to individual workers aged between 18 and 65, working between 20 and 120 h per week. Year dummies control for each of the 4 survey years. Industry dummies control for 17 different industry sectors. (*B*) UK Data on 29,000 Workers: Longitudinal Relationship Between Having Managerial Duties in Current Job and Age. UKHLS 2012-2018. *Notes*: Longitudinal (within-worker) relationship between having managerial duties and worker age in the UKHLS, United Kingdom, 2012 to 2018. The vertical bars represent the estimated coefficients (marginal effects) from the appropriate column in the fixed-effects regression in *SI Appendix*, Table *SU*3. These marginal effects capture percentage-point changes from baseline. The dependent variable *Job title: Manager* equals 1 if the worker has managerial duties in their current job, and 0 otherwise. The sample mean for *Job title: Manager* is 0.26, with a SD of 0.44. Number of workers: n = 28,985. Total number of observations: N = 63,686. The youngest age group (18 to 21) is the base reference category. Analyzed sample is restricted to individual workers aged between 18 and 65, working between 20 and 120 h per week. Year dummies control for each of the 4 survey years. Industry dummies control for 17 different industry sectors.

subjective feelings of autonomy. The hill shape might be viewed as especially unexpected because large numbers of well-being variables tend to have the reverse pattern, namely, to follow a U-shape through life (32–36). The approximate match here between subjective data and objective measures of autonomy seems to complement previous literature on the validation of data on humans' reported feelings.

How large is this growth and fall of job autonomy through a worker's life? It is approximately 0.6 points, in Fig. 1*A*, for example, on the chosen job-autonomy scale. This is substantial when

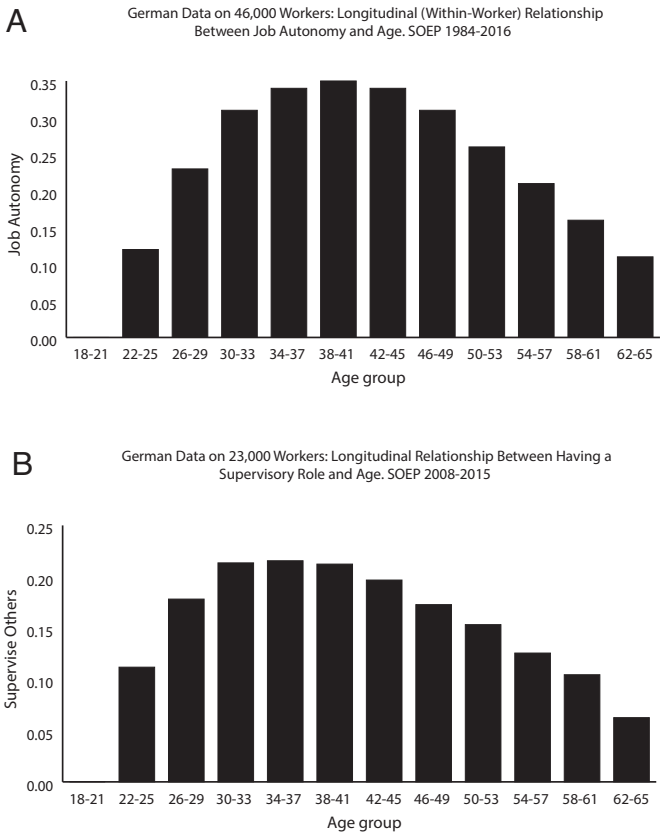

Fig. 3. (*A*) German Data on 46,000 Workers: Longitudinal (Within-Worker) Relationship Between Job Autonomy and Age. SOEP 1984 to 2016. Notes: Longitudinal (within-worker) relationship between job autonomy and worker age in the SOEP, Germany, 1984 to 2016. The vertical bars represent the estimated coefficients from fixed-effects regression model 3 reported in *SI Appendix*, Table SG1. Number of workers followed through time: n = 46,089. Total number of observations: N = 267,364. Workers are assigned a job autonomy score, by the SOEP itself, ranging from 1) "Low Autonomy" to 5) "High Autonomy" based on their occupational status. The sample mean for job autonomy is 2.74, with a SD of 1.10. The youngest age group (18 to 21) is the base reference category. Analyzed sample is restricted to individual workers aged between 18 and 65, working between 20 and 80 h per week. Year dummies control for each of the 33 survey years. Industry dummies control for 26 different industry sectors. (*B*) German Data on 23,000 Workers: Longitudinal (Within-Worker) Relationship Between Having a Supervisory Role and Age. SOEP 2008-2015. Notes: Longitudinal (within-worker) relationship between having a supervisory role and worker age in the SOEP, Germany, 2008 to 2015. The vertical bars represent the estimated coefficients (marginal effects) from the appropriate column in the fixed-effects regression in *SI Appendix*, Table SG2. These marginal effects capture percentage-point changes from baseline. The dependent variable *Supervise Others* equals 1 if the worker has a supervisory role in their current job, and 0 otherwise. The sample mean for *Supervise Others* is 0.31, with a SD of 0.46. Number of workers: n = 23,638. Total number of observations: N = 50,214. The youngest age group (18 to 21) is the base reference category. Analyzed sample is restricted to surveyed workers aged between 18 and 65 y, working between 20 and 80 h per week. Year dummies control for each of the 5 survey years. Industry dummies control for 26 different industry sectors. The *Supervise Others* variable is only available in survey years 2008 to 2015.

compared to other potential influences. It is a half a SD in the raw data, and in a simple cross-sectional job-autonomy equation, for example, the coefficient on a gender dummy alone is estimated at 0.3 (details are available on request, and fixed-effects findings are in *SI Appendix*, Table SA12).

Table 1 adds a further empirical contribution and one of a different kind. It summarizes the results of a survey we did of approximately 400 business executives. The table suggests that "demotions" are not rare.

Finally, as a complement to the results given within the main body of the paper, the *SI Appendix* contains a large set of other findings. To help with clarity, the *SI Appendix* tables and figures are denoted, in part, with the letters A, U, G, and E (for Australia, United Kingdom, Germany, and England). For completeness, the *SI Appendix* for each nation starts with the key diagram from the main text of the paper.

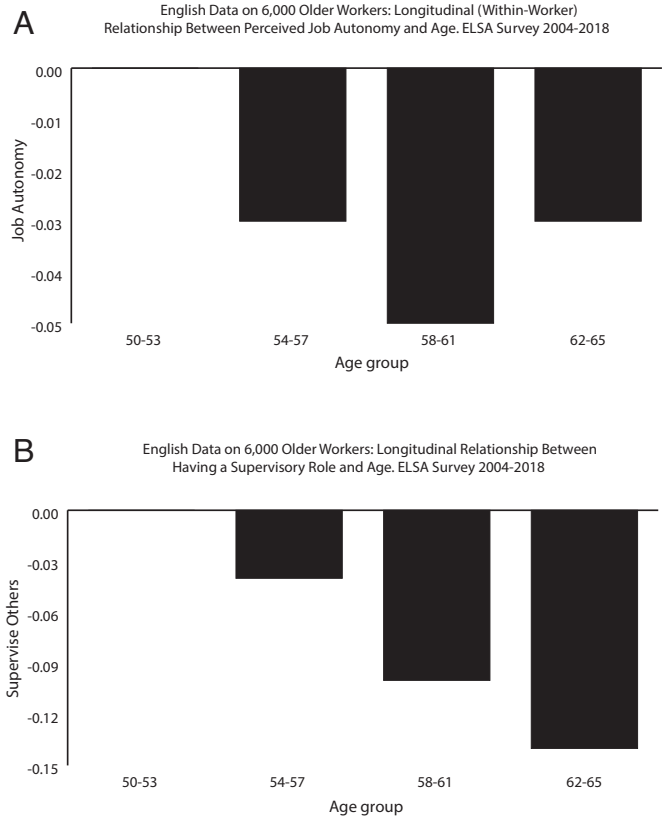

Fig. 4. (*A*) English Data on 6,000 Older Workers: Longitudinal (Within-Worker) Relationship Between Perceived Job Autonomy and Age. ELSA Survey 2004 to 2018. (Age 50 to 53 is the baseline category. No data available on under-50s). Notes: i) The vertical bars are all in the negative quadrant. ii) Longitudinal (within-worker) relationship between job autonomy and worker age in the ELSA Survey, England, waves 2 to 9 (biannual for years 2004/2005 to 2018/2019). The vertical bars represent the estimated coefficients from the fixed-effects regression of column 3 in *SI Appendix*, Table SE1. Number of workers: n = 6,119. Total number of observations: N = 14,998. Respondents assigned an integer value between 1) strongly agree and 4) strongly disagree to the statement: "*whether respondent feels they have little freedom to decide how to do their work*". Responses to this statement are used to measure *Job Autonomy*. The youngest age group (50 to 53) is the base reference category. Analyzed sample is restricted to individual workers aged between 50 and 65, working between 20 and 120 h per week. Year dummies control for each of the 8 survey waves. Job-type dummies control for 4 different job-type categories based on the level of physical activity in main job: *sedentary occupation*; *Standing occupation*; *Physical work*; *Heavy manual work*. (*B*) English Data on 6,000 Older Workers: Longitudinal (Within-Worker) Relationship Between Supervisory Responsibilities and Age. ELSA Survey, 2004 to 2018. (Age 50 to 53 is the baseline category. No data available on under-50s). Notes: Longitudinal (within-worker) relationship between the probability of being a supervisor and worker age in the ELSA Survey, England, Waves 2 to 9 (biannual for years 2004/2005 to 2018/2019). The vertical bars represent the estimated coefficients from the column 3 *SI Appendix*, Table SE2 fixed-effects regression—in which the dependent variable equals 1 if the respondent "directly supervises other people at work," and 0 otherwise. The sample average is equal to 0.36 with a SD of 0.48. Number of workers: n = 2,695. Total number of observations: N = 3,627. The youngest age group (50 to 53) is the base reference category. Analyzed sample is restricted to individual workers aged between 50 and 65, working between 20 and 120 h per week. Year dummies control for each of the 8 survey waves. Job-type dummies control for 4 different job-type categories based on the level of physical activity in main job: *Sedentary occupation*; *Standing occupation*; *Physical work*; *Heavy manual work*. The question wording is "*Do you directly supervise or are you directly responsible for the work of any other people? Yes/No.*" There are no individuals under the age of 50 in the ELSA dataset.

Table 1. Survey Evidence on Job Demotions and Age (N = 416)

In all of the organizations that you have worked for so far, do you know of anyone who has been demoted from a Supervisory Role (in which s/he supervised a group of other workers) into a nonsupervisory role?		
	No	37.5%
	Yes	62.5%
If YES – what was the demoted person's approximate age?		
	20 to 29	5%
	30 to 39	27%
	40 to 49	43%
	50 to 59	23%
	60+	2%
In all of the organizations that you have worked for so far, do you know of anyone who has been demoted from having the word Manager in their job title (that is, lost their Manager title)?		
	No	53%
	Yes	47%
If YES – what was the demoted person's approximate age?		
	20 to 29	5%
	30 to 39	32%
	40 to 49	42%
	50 to 59	18%
	60+	3%
Do you know of a number of people to whom this kind of demotion has happened?		
	A lot of people	6%
	A handful of people	60%
	None at all	34%

Notes: Our surveyed sample of N = 416 professional workers from various private and public organizations around the world. 85% of respondents held a supervisory or managerial role in their organization. This includes senior managers, directors, and executives (such as HR managers and directors).
Respondents were recruited through executive-education classes: MBA programs and alumni programs at Warwick Business School (England) during the year 2024/25, as well as from external private and public companies.
Summary of respondent characteristics: 62% male; 38% female. Age distribution: 9% (20 to 29 y old); 49% (30 to 39); 32% (40 to 49); 8% (50 to 59); 2% (60+). Highest educational attainment: high-school graduate (3%); diploma or certificate (3%); bachelor's degree (43%); master's degree (44%); PhD or doctorate (7%). See the *SI Appendix*. FIVE for survey questions and results.

SI Appendix, Fig. S*A*2, as one example of further findings, is constructed with long differences. It deliberately uses almost no formal econometrics. Instead, the diagram plots, on the y axis, the change in autonomy between 2008 and 2018 against, on the x axis, the worker's age. A downward slope implies here that older workers have slower rises, and in the negative quadrant greater actual falls, in job autonomy than younger workers. It can be seen from *SI Appendix*, Fig. S*A*2 that the negative quadrant starts in approximately people's 40s. Beyond that age, therefore, they are recording steadily lower scores for job autonomy each year (though the individuals themselves may not remember, when reinterviewed each time, the scores they gave in earlier years of the panel study).

Does gender make a difference to the hill shape? Apparently, it does not. The *SI Appendix* reveals for these countries that broadly the same pattern, with some slight differences in the speed of decline, holds for males and females separately (for example, in *SI Appendix*, Fig. S*A*3 for Australia).

In its different sections, the *SI Appendix* contains estimates for a range of subsamples of individuals (men, women, university graduates, nongraduates, full-time, part-time, supervisory, nonsupervisory, different job tenures, self-employed, and not self-employed). A broad robustness of the general result seems to emerge.

Is the concave curve that connects autonomy to age some form of extremely new phenomenon in our society? The data suggest that is unlikely. The *SI Appendix* takes balanced-panel subperiods (*SI Appendix*, Table S*A*4) and again produces approximately the familiar autonomy-age schedule in each of six subperiods of the modern era.

Does the inverted U-shape in autonomy vary across the private sector, the public sector, and the not-for-profit sector? The answer is that it somewhat does (*SI Appendix*, Table S*A*5). The finding tends to be sharpest in the private sector, which is the largest segment of an economy, although does hold approximately in the public sector also, but is weak in the charity sector. Perhaps the charity sector is more prone to an inflexible, age-based hierarchy.

Two caveats should be recorded.

First, the autonomy-by-age trajectory for self-employed people stands out as different (*SI Appendix*, Table S*A*7). It does not follow the typical hill-shaped curve of a peak in midlife, although it is true (though the SE bands are large) that autonomy appears to drop in later life. Second, the hill shape is slightly weaker for individuals with long job tenure in the organization (*SI Appendix*, Table S*A*7).

Another way to divide the data is into groups defined by occupational category. The *SI Appendix* gives various results. Managers per se, as an occupational class, tend to be the exception—if they have managerial status throughout their careers—to this paper's general rule that autonomy follows a sweeping hill shape through life. Perhaps that is to be expected and almost truistic: These individuals are presumably the uncommon men and women who are promoted over and over again.

Could the shape of Fig. 1 stem from some kind of unusual asymmetric form of attrition from the panel—a form of selection effect? First, given that the turning point in the diagram is in midlife, where retirements from work are minimal in an industrialized nation, a simple early-retirement explanation does not appear to fit the facts. Second, as a different and more formal exploration,

a set of autoregressive equations were estimated (reported in the *SI Appendix* in, for example, *SI Appendix*, Fig. S*A*5) to see whether high autonomy in time t predicted a person's greater attrition from the panel in time t + 1, which could have led to spuriously low levels of measured autonomy at older ages. No evidence was found for that. In some cases, the reverse, in fact, appeared to hold.

The *SI Appendix* does a specific test for the possibility that the observed erosion of job autonomy is being driven by employer-switching effects. It assesses this conceptual possibility by examining, for example, for Australian workers aged between 50 and 60 y old (i.e., close to the peak years of autonomy-contraction in the data), their mobility. *SI Appendix*, Table S*A*10, for instance, reveals that there is some job-to-job movement of that kind, but empirically that is not the main explanation for the hill shape in job autonomy with respect to age. The proportions in the table give the shares of workers who—in a given year—experience both a drop in job autonomy and also switch employers. In terms of the various measures of job autonomy, the numbers lie between a share of one-tenth and one-quarter of the individuals. So a change of employer accounts for some, although well under one-half, of the observed age-linked decrease in job autonomy in, for example, the original Fig. 1*A*.

It is natural to ask: where do former managers actually go in terms of occupational categories after they lose manager status? We looked into this. In the HILDA data, as an example, close to 40% of previous managers end up in the "Professionals" occupational category (38%); followed by Clerical and Administrative Workers (22%); and Technicians and Trades Workers (14%). About 10% of former managers in the HILDA end up in blue-collar roles after exiting the Manager category: Laborers (5%), plus Machinery Operators and Drivers (4%). Moreover, the patterns in the Figures cannot be explained by enormous numbers of promotions to extremely senior positions above manager grade. We have examined the data and such promotions are too few to have a noticeable effect on the mean values.

It is also scientifically natural to wonder how stable the hill-shaped contour is across different industries. The *SI Appendix* gives such results; there is considerable consistency (*SI Appendix*, Table S*A*9).

The *SI Appendix* goes through the equivalent sets of diagrams and tables for the other nations.

Discussion

Autonomy matters intensely to human beings. This paper combines subjective data and objective data to document a central—yet as far as we know almost entirely unrecognized—feature of modern working life.

Four conceptual points seem to stand out.

First, one way to think about the curved ascent and descent in Figs. 1–4 is that informal and formal demotions and "sidelining" must somehow be pervasive in a modern labor market. This is not what economists traditionally teach their students [*] (although it is partially consistent with what we view as two important, little-known, underappreciated, and rarely cited papers: refs. 24 and 25). Extra additional and qualitative support, admittedly on a smaller scale, for such a view is shown in Table 1 and in a variety of material in the *SI Appendix*.

Second, much of the analysis here draws upon data on workers' feelings about their own job autonomy—and such feelings are presumably fundamental because they matter and can also be expected to determine workers' chosen actions (37). Nevertheless, a set of objective measures of job autonomy and job seniority also rise and fall, in an appropriately matching way, with aging. So the job-autonomy curve through life is apparently not just about feelings.

Third, the waning of job autonomy in people's careers is not primarily because of voluntary or involuntary employer-switching during a career. The majority of the phenomenon occurs within employer. Moreover, as explained earlier, and illustrated in the *SI Appendix*, the pattern in Figs. 1–4 is not an illusory consequence of asymmetric attrition by high-autonomy individuals.

Fourth, and in ending, we believe that the patterns portrayed in this paper's diagrams and equations raise a number of scientific questions for economists, psychologists, human-resources specialists, business-school researchers, and other social and behavioral scientists. Why does job autonomy start to fall at the perplexingly young age of approximately 40? How can the paper's conclusions be compatible with the published evidence on U-shaped well-being through the bulk of life? Why is the rise and fall of autonomy so similar in shape across the nations studied here? This paper cannot answer these foundational and cross-disciplinary questions. They demand attention.

Materials and Methods

The analysis considers autonomy and seniority in informal and formal senses (ie. de facto and de jure). That is not a scientifically trivial task. The paper takes various approaches and proceeds in the following fashion.

One method that can be used to try to assess genuine seniority within a job hierarchy is to study data on job autonomy. A second is to examine managerial and supervisory job titles. The paper reports information and both of these approaches. The empirical results are broadly consistent across the two.

Four longitudinal surveys are used (for Australia, the United Kingdom, Germany, and England). All, given their terms of reference, are nationally representative of their countries. However, as explained below, the last dataset samples only a particular age range of older citizens.

The first data in this paper come from 18 waves (years 2002 to 2019) of the Household, Income and Labour Dynamics in Australia (HILDA) Survey, a nationally representative panel survey that began in 2001. More details are available in (38). That dataset is unusually useful for the current enquiry. As explained later, it includes remarkable questions about autonomy, job titles, and many related variables.

The HILDA Survey collects annual longitudinal information from members of Australian households who are at least 15 y of age. Data are collected each year by face-to-face interviews and self-completion questionnaires. The former technique is mainly used to gather the demographic and socioeconomic information, while the latter is adopted to measure personal health and lifestyle choices.

The paper makes use of some cardinal job-autonomy measures. Survey respondents are assigned in the initial analysis, for example, an integer value between (1) strongly disagree and (7) strongly agree to each statement: i) *I have a lot of freedom to decide how I do my own work*; ii) *I have a lot of freedom to decide when I do my work*; iii) *I have a lot of say about what happens on my job*. Averaged responses to the three statements then form a combined *"Job Autonomy"* level measured within the (1, 7) interval. As a robustness check, if we estimate fixed-effects regression equations for each of the three autonomy categories separately ("how," "when", and "what") on a set of banded age dummies, we find a hill-shaped profile in each of these. This result implies that the combined autonomy profile–averaged across all three questions–is not driven by one of the categories specifically. It is possible to criticize an approach that cardinalizes data on feelings, but the avenue has been pursued in a vast literature in social science and certain branches of medical science. Modern work (37, 39) documents evidence of a match between numerical feelings data and observed outcome data. See also (40, 41). Moreover, if we instead create a simple bivariate dependent variable (for high and low autonomy around the median level, for example), so that cardinal integer scaling is not being imposed, the hill shape remains the same.

[*] A search on the Web of Science finds that in the entire history of the Journal of Labor Economics, only three articles have mentioned demotions. One is (24); the other two are mathematical-model papers that explicitly construct theories of why demotions should hardly exist.

After excluding respondents with missing information on the key dependent variables and control variables, the total sample available for this study consists of 19,313 workers and 118,701 worker-year observations. We restrict our analysis to those HILDA respondents aged 18 to 65 who are working between 20 and 120 h per week in each wave. No observations are deliberately dropped. As would be expected, however, the sample sizes vary slightly across the different job autonomy and workplace-related measures.

At a later point, data on managers will be used. The key variable will be defined using answers to HILDA question *C11. What kind of work do you do in this job? That is, what is your occupation called and what are the main tasks and duties you undertake in this job? Please describe fully.*

(Obtain full title. Try to avoid one-word answers. For example: "shipping clerk", not just "clerk", "dairy farmer", not just "farmer", and "builder's labourer", not just "labourer".) (OCCUPATION TITLE) (pjbmo62) Refused title (98) Don't know title (99).

The second dataset is the UKHLS. Understanding Society, the UK Household Longitudinal Study, is a longitudinal survey of the members of approximately 40,000 households (at Wave 1) in the United Kingdom. Households recruited at the first round of data collection are visited each year to collect information on changes to their household and individual circumstances. Interviews are carried out face-to-face in respondents' homes by trained interviewers or through a self-completion online survey. Young people aged 10 to 15 complete a youth questionnaire, while respondents aged 16 and over complete the adult survey. The overall purpose of Understanding Society is to provide high-quality longitudinal data on subjects such as health, work, education, income, family, and social life to help understand the long-term effects of social and economic change, as well as policy interventions designed to impact upon the general well-being of the UK population. To this end, the Study collects both objective and subjective indicators and offers opportunities for research within and across multiple disciplines including sociology and economics, geography, psychology, and health sciences. The Understanding Society main survey sample consists of a large General Population Sample plus three other components: the Ethnic Minority Boost Sample, the former British Household Panel Survey sample and the Immigrant and Ethnic Minority Boost Sample.

The third dataset is the German SocioEconomic Panel (SOEP). The Panel is a longitudinal survey of approximately 15,000 private households in the Federal Republic of Germany from 1984 to 2021 and the eastern German länder from 1990 to 2021 (release 2023). The survey is undertaken by the Deutsches Institut für Wirtschaftsforschung (DIW), Berlin. Variables include household composition, employment, occupation, earnings, health, and satisfaction indicators.

The interview methodology of the SOEP is based on a set of pretested questionnaires for households and individuals. Principally an interviewer tries to obtain face-to-face interviews with all members of a given survey household aged 16 y and over. Additionally, one person (head of household) is asked to answer a household-related questionnaire covering information on housing, housing costs, and different sources of income. This covers also some questions on children in the household up to 17 y of age, mainly concerning attendance at institutions (kindergarten, elementary school)

Additional longitudinal data, in the fourth dataset, is for England rather than the United Kingdom. This is the English Longitudinal Study of Ageing (ELSA), which collects detailed information on a representative sample of adults over the age of 50. In the ELSA, there are 9 survey waves in total, spanning the years 2002 to 2019. We use waves 2 to 9, collected between the years 2004/2005 and 2018/2019, to examine longitudinal changes in the job autonomy of 6,119 workers (aged 50 to 65) and in total 14,998 worker-year observations. Similar to our analysis in the HILDA Survey, we restrict the sample to those workers who are working 20 to 120 h per week in each wave. For further details on the ELSA panel, see ref. 42.

Respondents in the ELSA survey assigned an integer value between 1) strongly agree and 4) strongly disagree to the statement: "*whether respondent feels they have little freedom to decide how to do their work*". Responses to this statement are used to measure *Job Autonomy*. The sample mean for job autonomy is 2.95, with a SD of 0.80.

It is not possible to test for the rise and fall of job autonomy in the way that can be done in the other datasets. That is because ELSA was created very substantially for use by gerontologists and medical researchers who wished to understand aging as it affects those approaching the last decades of their lives.

Nevertheless, the ELSA data do make it feasible to check whether, as the previous sections of the paper suggest, English workers' own perceived level of job autonomy diminishes between age 50 and the mid-60s. In this case, the main dependent variable that can be taken from ELSA is "*whether respondent feels they have little freedom to decide how to do their work*" and measured on a simple integer scale from 1 to 4. For intuitive ease of understanding, it is reverse-coded here for the paper's regression equations. In other words, negative coefficients imply lower autonomy. Thus the upper integer for autonomy, as captured by the freedom question given above, is the number 4. The sample mean for job autonomy in the paper's analysis is 2.95.

Results of a small survey of managers that we organized are reported in Table 1. The survey was granted full ethical approval by the University of Warwick Research Governance and Ethics Committee: HSSREC 80/24-25.

Survey participants–consisting mostly of experienced MBA and executive-education students at Warwick Business School–were informed verbally and in writing at the start that the proposed survey was completely voluntary and anonymous: "*This is a completely anonymous and voluntary survey about workplaces. We thank you for your time.*" They were then asked whether they were happy to participate. Those individuals who did not wish to participate simply did not receive or open the survey questionnaire. The survey was distributed both in-person and online, depending on the class, with the exact same instructions and consent information provided. Out of the 416 total responses, 13 respondents noted that they were aware of multiple instances of job demotions within their organization. That is, they explicitly had in mind more than one colleague who had been demoted at work, and thus separately wrote down the approximate age of these coworkers. For multiple responses by the same respondent, we treated these as separate observations or data points–with the same anonymized identifiers and demographic variables. The latter approach is standard in longitudinal or panel-data surveys. Overall, the small number of such additional entries did not affect the main descriptive results.

Data, Materials, and Software Availability. Data for the United Kingdom are taken from the UKHLS covering 2012 to 2018. German data are sourced from the SOEP between 1984 and 2016. Australian data are from the HILDA survey, with years from 2002 to 2019. Data for England come from the ELSA survey, covering years 2004 to 2018. These datasets are widely accessible for researchers, but we are not permitted to repost these datasets to a repository. Data and code for the complementary survey (as reported in Table 1) are available at https://osf.io/d5epb/?view_only=992c44d6c2284f7f9df8b3dbbf628565 (43). All other data are included in the manuscript and/or *SI Appendix*.

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1. D. E. Brown, *Human Universals* (McGraw Hill, New York, NY, 1991).
2. F. P. Morgeson, K. Delaney-Klinger, M. A. Hemingway, The importance of job autonomy, cognitive ability, and job-related skill for predicting role breadth and job performance. *J. Appl. Psychol.* **90**, 399–406 (2005).
3. M. Benz, B. S. Frey, The value of doing what you like: Evidence from the self-employed in 23 countries. *J. Econ. Behav. Org.* **68**, 445–455 (2008).
4. B. S. Frey, Does monitoring increase work effort? The rivalry with trust and loyalty *Econ. Inq.* **31**, 663–670 (1993).
5. D. Honig, Supportive management practice and intrinsic motivation go together in the public service. *Proc. Natl Acad. Sci U.S.A.* **118**, e2015124118 (2021).
6. G. A. Akerlof, R. E. Kranton, Identity, supervision, and work groups. *Am. Econ. Rev.* **98**, 212–217 (2008).

7. A. Wrzesniewski, B. Schwartz, T. Kolditz, Multiple types of motives don't multiply the motivation of West Point cadets. *Proc. Natl Acad. Sci U.S.A.* **111**, 10990–10995 (2014).
8. A. E. Clark, Your money or your life: Changing job quality in organisation for economic co-operation and development countries. *Br. J. Ind. Relat.* **43**, 377–400 (2005).
9. H. Reisinger, D. Fetterer, Forget flexibility: Your employees want autonomy. (2021). https://hbr.org/2021/10/forget-flexibility-your-employees-want-autonomy. Accessed 1 February 2025.
10. R. A. Karasek, Job demands, job decision latitude and mental strain: Implications for job redesign. *Admin. Sci. Q.* **24**, 285–308 (1979).
11. P. B. Warr, Decision latitude, job demands, and employee well-being. *Work Stress* **4**, 285–294 (1990).
12. R. M. Ryan, E. L. Deci, Self-determination theory and the facilitation of intrinsic motivation, social development, and well-being. *Am. Psychol.* **55**, 68–78 (2000).
13. D. Deming, The growing importance of decision-making on the job (National Bureau of Economic Research, Cambridge, MA, 2021).
14. N. A. Busis, T. D. Shanafelt, T. L. Cascino, Burnout, career satisfaction, and well-being among US neurologists in 2016. *Neurology* **88**, 797–808 (2017).
15. M. Nikolova, F. Cnossen, What makes work meaningful and why economists should care about it. *Labour Econ.* **65**, 101847 (2020), DOI10.1016/j.labeco.2020.101847.
16. J. De Jonge, W. B. Schaufeli, Job characteristics and employee well-being: A test of warr's vitamin model in health care workers using structural equation modelling. *J. Org. Beh.* **19**, 387–407 (1998).
17. A. Van Hoorn, How much does job autonomy vary across countries and other extra-organizational contexts? *Int. J. Hum. Resour. Manag.* **29**, 420–463 (2016).
18. S. K. Parker, H. M. Williams, N. Turner, Modeling the antecedents of proactive behavior at work. *J. Appl. Psychol.* **91**, 636–652 (2006).
19. S. K. Parker, G. Grote, Automation, algorithms, and beyond: Why work design matters more than ever in a digital world. *App. Psychol. Int. Rev.* **71**, 1171–1204 (2019).
20. G. Baker, M. Gibbs, B. Holmstrom, The internal economics of the firm: Evidence from personnel data. *Quar. J. Econ.* **109**, 881–919 (1994).
21. E. Lazear, K. Shaw, Personnel economics: The economist's view of human resources. *J. Econ. Perspect.* **21**, 91–114 (2007).
22. E. Lazear, P. Oyer, Internal and external labor markets: A personnel economics approach. *Labour Econ.* **11**, 527–544 (2004).
23. P. Howlett, The internal labour dynamics of the great eastern railway company, 1870–1913. *Econ. Hist. Rev.* **57**, 396–422 (2004).
24. C. Belzil, M. Bognanno, Promotions, demotions, halo effects, and the earnings dynamics of American executives. *J. Labor Econ.* **26**, 287–310 (2008).
25. P. M. Guest, Executive mobility and minority status. *Ind. Relat.* **55**, 604–631 (2016).
26. D. Lagakos, B. Moll, T. Porzio, N. Qian, T. Schoellman, Life cycle wage growth across countries. *J. Polit. Econ.* **126**, 797–849 (2018), 10.1086/696225
27. M. Bhuller, M. Mogstad, K. G. Salvanes, Life-cycle earnings, education premiums, and internal rates of return. *J. Labor Econ.* **35**, 993–1030 (2017).
28. T. J. Dohmen, B. Kriechel, G. A. Pfann, Monkey bars and ladders: The importance of lateral and vertical job mobility in internal labor market careers. *J. Popul. Econ.* **17**, 193–228 (2004).
29. C. Grund, M. Rubin, The role of employees' age for the relation between job autonomy and sickness absence. *J. Occup. Environ. Med.* **63**, 800–807 (2021).
30. H. Lopes, S. Lagoa, T. Calapez, Declining autonomy at work in the EU and its effect on civic behavior. *Econ. Indus. Democracy* **35**, 341–366 (2014).
31. D. Acemoglu, N. Søndergaard Mühlbach, A. J. Scott, The rise of age-friendly jobs. *J. Econ. Ageing* **23**, 100416 (2022).
32. T. Cheng, N. Powdthavee, A. J. Oswald, Longitudinal evidence for a midlife nadir in human well-being: Results from four data sets. *Econ. J.* **127**, 126–142 (2017).
33. C. Graham, J. R. Pozuelo, Happiness, stress, and age: How the U curve varies across people and places. *J. Popul. Econ.* **30**, 225–264 (2017).
34. D. G. Blanchflower, A. J. Oswald, Is well-being u-shaped over the life cycle? *Soc. Sci. Med.* **66**, 1733–1749 (2008).
35. R. Mujcic, A. J. Oswald, Is envy harmful to a society's psychological health and wellbeing? A longitudinal study of 18, 000 adults *Soc. Sci. Med.* **198**, 103–111 (2018).
36. A. A. Stone, J. E. Schwartz, J. E. Broderick, A. Deaton, A snapshot of the age distribution of psychological well-being in the United States. *Proc. Natl Acad. Sci U.S.A.* **107**, 9985–9990 (2010).
37. C. Kaiser, A. J. Oswald, The scientific value of numerical measures of human feelings.
38. M. Wooden, N. Watson, The HILDA survey and its contribution to economic and social research (so far). *Econ. Rec.* **83**, 208–231 (2007).
39. R. Perez-Truglia, A samuelsonian validation test for happiness data. *J. Econ. Psychol.* **49**, 74–83 (2015).
40. D. J. Benjamin, O. Heffetz, M. S. Kimball, A. Rees-Jones, Can marginal rates of substitution be inferred from happiness data? Evidence from residency choices *Am. Econ. Rev.* **104**, 3498–3528 (2014).
41. J. E. De Neve, G. Ward, *Measuring Workplace Wellbeing* (Wellbeing Research Centre, Oxford University, 2023).
42. J. Banks, G. D. Batty, J. Y. Nazroo, A. Steptoe, *The Dynamics of Ageing: Evidence from the English Longitudinal Study of Ageing 2002–15* (Institute of Fiscal Studies, London, 2016).
43. R. Mujcic, A. J. Oswald, Survey data from "The growth and collapse of autonomy at work." Open Science Framework. https://osf.io/d5epb/?view_only=992c44d6c2284f7f9df8b3dbbf628565. Deposited 13 April 2025.