



Supplementary Information for

Experienced well-being rises with income, even above \$75,000 per year

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Results for alternate life satisfaction measures

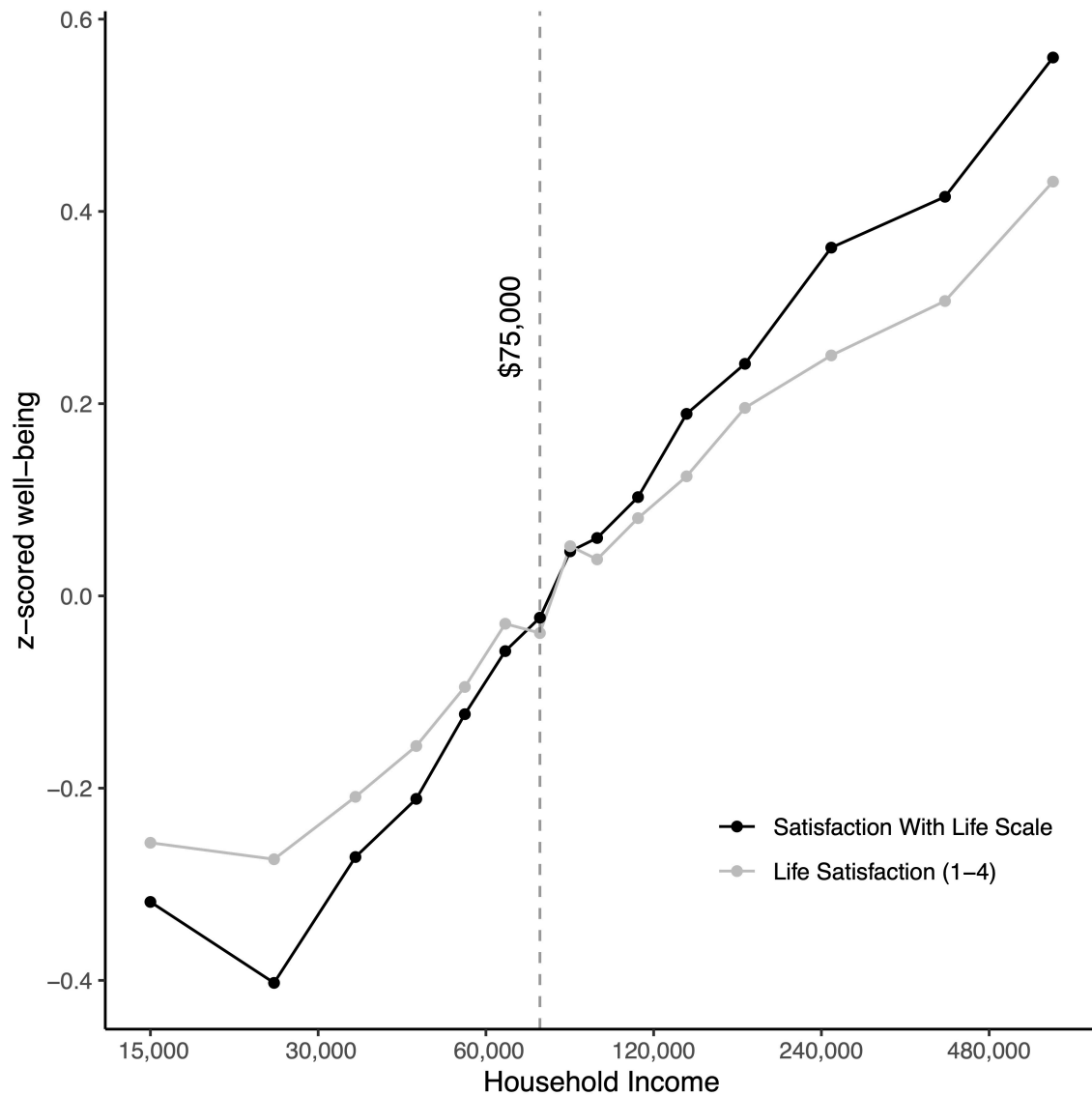


Fig. S1. Mean levels of the Satisfaction With Life Scale, and a four-level single-item Life Satisfaction measure, for each income band.

Positive and negative feelings results

Table S1. Number of observations for positive and negative feelings

Good	71,577
Inspired	50,022
Proud	49,693
Interested	50,269
Confident	18,765
Bad	71,577
Bored	34,097
Upset	49,672
Afraid	49,782
Angry	49,839
Sad	49,159
Stressed	50,214

Table S2. Regression results for individual positive and negative feelings, across the entire income range (“overall”) and separately below and above \$80,000/year.

Feeling	Slope (overall)	P value	Slope (below \$80,000)	P value	Slope (above \$80,000)	P value
Confident	2.44	< .00001	1.47	0.0169	2.67	.000012
Good	1.24	< .00001	1.10	0.00812	1.61	.00004
Inspired	1.09	< .00001	0.754	0.123	1.33	0.00752
Interested	2.00	< .00001	1.58	0.00072	2.40	< .00001
Proud	2.01	< .00001	3.24	< .00001	1.88	.00006
Afraid	-0.95	< .00001	-1.48	0.00184	-0.0048	0.992
Angry	-0.69	0.000319	-1.53	0.000535	-0.35	0.438
Bad	-1.76	< .00001	-2.00	< .00001	-1.99	< .00001
Bored	-2.04	< .00001	-2.61	< .00001	-1.31	0.0163
Sad	-2.37	< .00001	-2.84	< .00001	-2.14	< .00001
Stressed	-0.43	0.0476	-1.17	0.0185	-0.071	0.888
Upset	-1.31	< .00001	-1.57	0.000696	-1.66	0.000385

Larger incomes were associated with significantly higher levels of all positive feelings and significantly lower levels of all negative feelings, when analyzed across the entire income range. Below \$80,000, larger incomes were associated with significant higher levels of four of five positive feelings and significantly lower levels of all negative feelings, while above \$80,000, larger incomes are associated with significant higher levels of all positive feelings and significantly lower levels of four of seven negative feelings.

Comparing positive and negative feeling slopes, below and above \$80,000.

Both positive and negative feelings improved with income, including when analyzed across the entire income range or when analyzed separately below and above \$80,000, as shown in Table S2. There was also some evidence that larger incomes for lower earners disproportionately reduced negative feelings while larger incomes for higher earners disproportionately increased positive feelings. The slope between larger incomes and reduced negative feelings was directionally steeper below \$80,000 than above it, for six out of seven negative feelings (afraid, angry, bad, bored, sad, stressed). In contrast, the slope between larger incomes and increased positive feelings was directionally steeper *above* \$80,000 than below it, for four out of five positive feelings (confident, good, inspired, and interested). On average, the slope between larger incomes and reduced negative feelings was 74% larger *below* \$80,000 than it was above it, while the slope between larger incomes and greater positive feelings was 21% larger *above* \$80,000 than it was below it (see Table S3). Most of these differences within single feelings were not statistically significant on their own, so conclusions about specific feelings should not be drawn. However, an overall analysis follows below and shows that this pattern with respect to valence (positive feelings vs. negative feelings) was statistically significant.

Table S3. Comparing positive and negative feeling slopes, above and below \$80,000/year. Positive feelings all had a positive slope with income, and for 4 out of 5 positive feelings they had directionally more positive slopes with income above \$80,000 compared to below it. Negative feelings all had a negative slope with income (i.e., negative feeling levels were lower for larger incomes), and these slopes become less negative for 5 out of 7 negative feelings for income above \$80,000 compared to below it. On average, the slope between larger incomes and greater positive feelings was 21% larger *above* \$80,000 than it was below it (1.98 vs. 1.63), while the slope was 43% smaller for negative feelings above \$80,000 compared to the slope below \$80,000, or, equivalently, the slope between larger incomes and reduced negative feelings was 74% larger *below* \$80,000 than it was above it (-1.88 vs. -1.08). However, most of these differences in slope below vs. above \$80,000 for single feeling measures were not statistically significant.

Feeling	Slope below \$80,000	Slope above \$80,000	P value difference	% difference
Confident	1.47	2.67	0.166	+82%
Good	1.10	1.61	0.376	+46%
Inspired	0.754	1.33	0.418	+76%
Interested	1.58	2.40	0.213	+52%
Proud	3.24	1.88	0.040	-42%
Average	1.63	1.98		+21%
Afraid	-1.48	-0.0048	0.029	-100%
Angry	-1.53	-0.35	0.062	-77%
Bad	-2.00	-1.99	0.987	-0.5%
Bored	-2.61	-1.31	0.097	-50%
Sad	-2.84	-2.14	.30	-25%
Stressed	-1.17	-0.071	.119	-94%
Upset	-1.57	-1.66	.889	+6%
Average	-1.89	-1.08		-43%

Evaluating whether there was an overall difference in slopes for positive vs. negative feelings when comparing variation in income above \$80,000 versus below \$80,000 was done by computing the three-way interaction between income, feeling valence (positive vs. negative), and income category (above vs.

below \$80,000). The three-way interaction was significant ($P = .0015$), showing that differences in income below \$80,000 were comparatively stronger in reducing negative feelings, while differences in income above \$80,000 were comparatively stronger in increasing positive feelings. This analysis was performed by reshaping the data into long format with one row for each feeling for each person, using an indicator called “valence” that categorized each feeling as positive or negative, reverse-coding negative feelings so that higher levels indicated “better” experienced well-being across both positive and negative feelings, and using an indicator for whether income was above or below \$80,000. Then a multi-level regression was performed predicting feeling intensity with terms: $\log(\text{income})$, the indicator for whether income was above or below \$80,000, and valence of the feeling (positive or negative), plus all possible interactions of these three terms. The predictor variables were centered, and random effect intercepts were included for person and specific feeling (allowing for the fact that some participants provided responses for more than one specific feeling, and that different specific feelings may have different mean levels). The three significant terms were income (higher incomes predicted greater well-being), feeling valence (negative feelings were closer to minimum intensity than positive feelings were close to maximum intensity), and the three-way interaction (differences in income below \$80,000 were comparatively more associated with reducing negative feelings, while differences in income above \$80,000 were comparatively more associated with increasing positive feelings); see Table S4.

Table S4. Multi-level regression comparing results for positive and negative feelings.

	Estimate	P value
Intercept	64.89****	P < .00001
Log(income)	1.603****	P < .00001
Income category (above vs. below \$80,000)	-0.159	0.517
Feeling valence	-16.5**	.00198
Log(income)*Income category	0.345	0.281
Log(income)*Feeling valence	0.300	0.088
Income category*Feeling valence	0.148	0.581
Log(income)* Income category*Feeling valence	1.113**	0.0015

The significant three-way interaction between log(income), income category (above vs. below \$80,000) and feeling valence (positive vs. negative) indicates that larger incomes below \$80,000 were comparatively more associated with a reduction in negative feelings, while larger incomes above \$80,000 were comparatively more associated with an increase in positive feelings.

Multilevel regression results for overall positive and overall negative feelings. Using the same approach for multilevel regression (a fixed effect for feeling intensity and a random effect for specific feeling) also makes it possible to estimate the overall association between income and positive feelings, and income and negative feelings. Rather than analyzing specific feelings such as pride or sadness individually, this allows one to determine whether, overall, positive feelings and/or negative feelings are associated with income. Results are significant in support of larger incomes being associated with greater positive feelings and reduced negative feelings, whether analyzing across the entire income range or separately analyzing incomes below and above \$80,000/year. In these models, larger incomes across the entire income range are associated with greater positive feelings (P < .00001) and reduced negative feelings (P < .00001), larger incomes below \$80,000 were associated with greater positive feelings (P < .00001) and reduced negative feelings (P < .00001), and larger incomes above \$80,000 were also associated with greater positive feelings (P < .00001) and reduced negative feelings (P < .00001).

Existing evidence regarding income and evaluative well-being. Most past research has found that evaluative well-being increases linearly with log(income), without a noticeable plateau (although see one recent counterpoint (1)). A 2013 review examined a number of major datasets and concluded that there was no evidence for an income plateau in evaluative well-being, and that larger

log(income) had a linear relationship to increased well-being, including an equally steep association with evaluative well-being at the top of the income distribution as at the bottom of the income distribution; if anything, the association between log(income) and evaluative well-being was steeper in wealthier countries than in poorer ones (2). They concluded, “While the idea that there is some critical level of income beyond which income no longer impacts [evaluative] well-being is intuitively appealing, it is at odds with the data. As we have shown, there is no major well-being dataset that supports this commonly-made claim.” That conclusion had the explicit caveat that it was limited to evaluative well-being, which is what was measured in virtually all past research. The one differing result for experienced well-being published at that time (3) was noted, but not viewed to be in conflict with this conclusion, since the measure of well-being was experienced rather than evaluative.

Additional discussion: why the current results might differ from past results showing a plateau in experienced well-being. Without performing a direct comparison of methods in the same participants and/or a direct comparison of participants using the same method, it is impossible to know with certainty why the current study and the two related studies finding a plateau in experienced well-being differ in their results. As described in the main text, the current study possesses a number of methodological differences compared to these earlier studies, including the real-time measurement of experienced well-being. The most straightforward reason these results might have differed from past research, however, is the scale used to measure experienced well-being.

The current study finds that larger incomes above \$80,000 had a comparatively steeper and more consistent association to increased positive feelings than to reduced negative feelings (see Table S2), such that a sensitive measure of positive feelings may be needed to reliably detect the benefit of higher incomes for experienced well-being. The studies finding a plateau in experienced well-being both used a dichotomous scale, meaning there are only two possible levels that could be measured. This could have made it difficult to detect the full range of experienced well-being, especially for those with high incomes. Examining Figure 1 in the 2010 paper finding a plateau (3) shows that positive feelings (“positive affect”) appeared to have been at the response ceiling in slightly more than 70% of responses at the lowest income level, and around 87-88% of responses at upper income levels. Accordingly, the vast majority of participants in that study were indicating the highest possible level of positive feelings the scale allowed at incomes of \$75,000, limiting the ability to detect further improvements in people with incomes above \$75,000, and suggesting that a

ceiling effect could account for the difference in results. For example, it is conceivable that happiest 50% of participants earning incomes more than \$75,000 felt considerably more intense and frequent positive feelings than the happiest 50% of participants earning less than \$75,000, but if they were all already at the response ceiling on the dichotomous scale, no difference would be detectable.

Examining Figure 1(b) in the 2018 paper finding a plateau (1) similarly shows that for North America (the closest geographical match to the U.S. participants studied in the current paper and in the 2010 paper), positive feelings (“positive affect”) were at the response ceiling in approximately 77-78% of responses at low incomes (\$5,000) and approximately 87-88% of responses at upper incomes. Although the current results suggest that the association between larger incomes and increased experienced well-being manifests most strongly in increased positive feelings, (the absence of) negative feelings also varies with income. These values were not as extreme as positive feelings in the data finding a plateau, but examining Figure 1 in the 2010 paper shows that approximately 53-54% of responses were at the response ceiling for (absence of) negative feelings (“not blue”) at the lowest income level, and this rose to approximately 80% of responses at upper income levels. Figure 1(c) in the 2018 paper similarly shows that the (absence of) negative feelings was at the response ceiling in approximately 55% of responses at incomes of \$5,000 and increased to 70-73% of responses at upper income levels. Thus, for negative feelings, too, the vast majority of responses from people with incomes around \$75,000 were at the response ceiling, which may have limited the ability to detect further improvements in experienced well-being in people with incomes above \$75,000.

Extended results for the unrestricted sample. As shown in Table 1(c), the finding that experienced well-being rises with income, both overall, and separately below and above \$80,000, holds true when analyzing an unfiltered dataset. In general, results are statistically significant and qualitatively unchanged in the unfiltered dataset, compared to the results presented in the main text, with no known instances of meaningful differences in their pattern of results. For example, the three-way interaction between feeling valence, income category, and feeling intensity presented in table S4 is shows a qualitatively unchanged result in the unfiltered dataset ($b = 1.432$, $P < .00001$). Using multilevel regression with a fixed effect for feeling intensity and a random effect for specific feeling to estimate the overall association between income and positive feelings, and income and negative feelings, also shows qualitatively the same results in the unfiltered dataset. In these models, larger incomes across the

entire income range are associated with greater positive feelings ($P < .00001$) and reduced negative feelings ($P < .00001$), larger incomes below \$80,000 were associated with greater positive feelings ($P < .00001$) and reduced negative feelings ($P < .00001$), and larger incomes above \$80,000 were also associated with greater positive feelings ($P < .00001$) and reduced negative feelings ($P = .00081$). Results for all three evaluative well-being measures (the matched construction life satisfaction question, the Satisfaction With Life Scale, and the 1-4 life satisfaction question) also show qualitatively the same results in the unfiltered data as in the main results, with larger incomes across the income range associated with greater evaluative well-being (all P 's $< .00001$), larger incomes below \$80,000 associated with greater evaluative well-being (all P 's $< .00001$) and larger incomes above \$80,000 associated with greater evaluative well-being (all P 's $< .00001$).

Moderators and mediators. Mediation and moderation provide additional insight into the association between income and well-being. At the same time, the universe of possible mediators and moderators is large and causality cannot be inferred from mediation alone, so some caution is warranted when interpreting these results (as would be advisable when interpreting any non-experimental mediation or moderation results for income and well-being). The results themselves, however, are statistically robust. All candidate variables were tested for both mediation and moderation, except for two variables (Money Importance and Money is Success) that were specifically hypothesized to be moderators of the income:well-being association, which were analyzed only as moderators.

Table S5. Mediation results

Variable	b_{income}	b_{income} (with mediator as covariate)	$P_{\text{mediation}}$	% Mediated
Control Life	1.30****	0.34***	****	74%
Control Situation	1.37****	0.97****	****	29%
Optimism	1.33****	0.95****	****	29%
Financial Insecurity	1.20****	0.74****	****	38%
Hours worked	1.34****	1.38****	*	-3%
Time poverty	1.24****	1.33****	****	-8%

Parameter estimates were calculated using regression, with b_{income} equal to the slope of the association between experienced well-being and $\log(\text{income})$ with no covariates, while b_{income} (with mediator as a covariate) estimates the slope once the candidate mediator is included in the model as a covariate, in the participants with data for the mediator in question. Mediation P values and % mediated were calculated using nonparametric bootstrap confidence intervals from the 'mediation' package in R. For example, this method of analysis results in an estimate that 74% of the 'effect' of income on experienced well-being is mediated by Control Life, with 95% CI = [.687, .820], $P < .00001$, a result that is essentially identical to the basic regression results (e.g., $(1.30 - 0.34) / 1.30 = 74\%$).

People's sense that they are in control of their lives was the largest mediator of the income-experienced well-being relationship (74% mediated), while financial insecurity was the second largest mediator, despite a weak zero-order correlation with experienced well-being (38% mediated, while $r = -0.14$). Both hours worked and time poverty were small but significant negative mediators, suggesting that income might have a (slightly) more positive association with experienced well-being if a higher income were achieved without working more hours or feeling that one has too little time.

Table S6. Moderation results

Variable	b_{income}	$b_{\text{moderator}}$	$b_{\text{interaction}}$	Sig. Moderation
Money Importance	1.14****	0.10(ns)	0.71****	Yes
Money is Success	1.36****	-0.64****	0.63***	Yes
Control Life	0.34***	6.16****	0.35****	Yes
Control Situation	0.97****	5.01****	0.31***	Yes
Optimism	0.94****	6.08****	0.35****	Yes
Financial Insecurity	0.75****	-1.45****	0.07(ns)	No
Hours worked	1.37****	-0.19*	-0.08(ns)	No
Time poverty	1.33****	-1.32****	0.104(ns)	No

Moderation assesses whether the slope of the relationship between income and experienced well-being depends on (i.e., is moderated by) some other variable. Moderation results present the parameter estimates for regressions that contain the main effect of $\log(\text{income})$, the main effect of the moderator in question, and the interaction between these two variables, with the interaction term quantifying moderation, and all candidate moderators centered and standardized prior to analysis. For example, people's answers to the question, "To what extent is money important to you?" ('Money Importance') did not directly predict experienced well-being $b_{\text{moderator}} = 0.10(\text{ns})$ but, instead, interacted with income to predict experienced well-being, such that income had a considerably stronger association to experienced well-being for people who said money was important to them ($b_{\text{interaction}} = 0.71$, $P < .00001$). The 'money is success' measure also showed a meaningful degree of moderation, although its negative main effect meant that equating money and success was negatively associated with well-being overall, and became less negative for well-being as income rose, without ever clearly being positively associated with well-being (a simple interpretation of the interaction term suggests that 'money is success' would become a positive predictor of well-being at high income levels, but a more detailed inspection of the association shows that this was not the case). Sense of control over life, situational sense of control, and a measure of optimism all showed a significant degree of moderation, but either acted primarily as a mediator (control over life) or had moderation values distinctly smaller than the main effect of income (situational sense of control, optimism). Neither financial insecurity, number of hours worked, nor time poverty were significant moderators of the association between income and experienced well-being.

Table S7. The number of people with data for mediators and moderators.

Variable	People with data	Raw number of observations
Money Importance	9,109	15,196
Money is Success	9,062	14,985
Control Life	22,675	77,532
Control Situation	22,870	78,901
Optimism	22,630	77,200
Financial Insecurity	17,029	66,997
Hours Worked	13,765	26,255
Time Poverty	14,083	30,577

If a person had more than one response, the mean value was used in calculations.

Table S8. The demographic distribution of study participants, compared to the U.S. census. The current sample of participants is neither intended nor claimed to be representative of the U.S. population, but it is also not wildly different from the general population. Most relevant to the focus on the current study, participants actually did closely match the general population on household income distribution. Other variables showed differences to some degree. Compared to the general population, study participants had greater representation of females, greater representation of unmarried people, greater representation of 18-35 year-olds, and less representation of 50-65 year-olds. In terms of education, study participants had more representation of people with bachelor’s degrees or advanced degrees, and less representation of people with lower levels of education. Even after controlling for these demographic variables, the association between income and experienced well-being remained statistically significant (see Table S9). Census values are based on 2018 data (income distribution) or 2019 data (other variables), for people under age 65. Demographic groupings in the table (e.g., income groups or age groups) are based on aggregating the census and/or the current study into the most granular groups that both datasets support (compared to the census data files that were accessed, the current study had more granular data on age, education level, and income for upper incomes, while the census had more a more granular data on income for lower incomes).

Variable	Value	Study	Census
Household Income	\$10,000 - \$ 20,000	4.5%	6.8%
Household Income	- \$ 30,000	6.4%	7.6%
Household Income	- \$ 40,000	7.8%	8.2%
Household Income	- \$ 50,000	8.0%	7.9%
Household Income	- \$ 60,000	8.1%	8.0%
Household Income	- \$ 70,000	7.1%	7.1%
Household Income	- \$ 80,000	7.1%	6.8%
Household Income	- \$ 90,000	6.2%	5.7%
Household Income	- \$100,000	6.7%	5.2%
Household Income	- \$125,000	11.1%	10.7%
Household Income	- \$150,000	8.6%	7.1%
Household Income	- \$200,000	9.4%	8.5%
Household Income	> \$200,000	9.0%	10.3%
Gender	% Female	63.9%	50.8%
Marriage	% Married	37.3%	51.5%
Age	18 - 25	15.9%	14.7%
Age	- 30	24.9%	11.8%
Age	- 35	18.9%	11.1%
Age	- 40	11.9%	10.8%

Variable	Value	Study	Census
Age	- 45	9.8%	9.9%
Age	- 50	7.1%	10.3%
Age	- 55	5.5%	10.3%
Age	- 60	3.9%	10.7%
Age	- 65	2.1%	10.4%
Education	Less than high school	0.5%	10.2%
Education	High school graduate	2.7%	27.5%
Education	Some college or associate's degree	19.3%	28.4%
Education	Bachelor's degree	44.0%	22.2%
Education	Advanced degree	33.5%	11.7%

Table S9. Regression results for income and experienced well-being, controlling for demographic variables.

	Overall	Up to \$80,000	Above \$80,000
No covariates	.113****	.109****	.110****
With demographic covariates	.070****	.086****	.068****

(covariates: age, gender, marriage, education level)

People with larger incomes tend to differ from people with lower incomes in terms of age, marriage, gender, and education level. Nevertheless, while adding demographic variables as covariates modestly reduced the slope of the association between income and experienced well-being, these variables did not eliminate it, with significant associations persisting overall, below \$80,000, and above \$80,000 (all P 's < .00001), and with a majority of the slope intact.

For reference: Well-being measures employed in papers reporting an experienced well-being plateau. The two cited papers finding a plateau in experienced well-being around \$75,000/year are based on different versions of the same Gallup dataset. The 2010 paper (3) included telephone survey results from U.S. participants, while the 2018 paper (1) included global participants and mixture of telephone surveys and in-person interviews, with telephone surveys used in countries with reasonable telephone penetration (“telephone surveys were used in countries where telephone coverage represented at least 80% of the population” (1)). In both cases, experienced well-being was measured dichotomously with Yes/No answers to the question "Did you experience the following feelings during A LOT OF THE DAY yesterday? How about _____?"

for six feelings, each asked separately (positive: Enjoyment, Happiness; negative: Stress, Worry, Anger, Sadness) plus a dichotomous Yes/No question, "Did you smile or laugh a lot yesterday". Evaluative well-being was measured by asking people, "Please imagine a ladder with steps numbered from 0 at the bottom to 10 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. On which step of the ladder would you say you personally feel you stand at this time?"

SI References

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