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National Worry and the Psychological Value of Social Spending

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ABSTRACT

This paper studies “national worry.” It finds that in the West European nations the intensity of worry seems to be inversely linked to the level of social spending in a country. We also demonstrate that the proportion of citizens in Western Europe who report extreme-worry levels has risen steadily over the last two decades. The United Kingdom experienced the fastest increase in worry. Our country-panel estimates point to a potentially central role for the little-discussed *ex ante* psychological value of the welfare state (i.e., the benefit to the whole population, and not just the mental-wellbeing gains going *ex post* to the smaller number of citizens who actually draw upon welfare-state help). Worry levels move with other economic variables, including the unemployment rate, and we provide some of the first estimates of the patterns of worry across different kinds of individuals. Finally, the analysis is extended to the set of OECD countries. We believe that much needs to be understood about the troubling rise of worry in modern society.

JEL Classification: I31, I14, I12

“Worry is the stomach’s worst poison.” Statement attributed to Alfred Nobel

“Worrying ... subtracts from the present well-being of individuals, which is why affluent societies have complex systems of ... insurance and public social protection.”
Osberg and Sharpe (2014).

1 | Introduction

This paper proposes and explores empirically the concept of “national worry.” We offer evidence that in Western Europe the intensity of worry seems to be linked to the level of social spending in an economy.

Worry is a forward-looking emotion that reduces current wellbeing (Osberg and Sharpe 2014). More broadly, a recently documented strong relationship between worry and mental health in general populations calls for efforts to explore the potential determinants of worry (Višlă et al. 2022). According to the OECD Framework of subjective wellbeing, worry is to be considered an indicator of negative affect (OECD 2013). Unlike other negative emotions, worry has one special and valuable feature: it captures human beings’ fears for the future. The APA Dictionary of Psychology defines worry as “a state of mental distress or agitation due to concern about an impending or anticipated event, threat, or danger.” Data on worry and on happiness thus provide information on different aspects of psychological wellbeing. In our later data, the Pearson correlation coefficient between happiness and worry within the OECD nations is -0.20 . Worry and stress are somewhat more strongly correlated, at 0.32 .

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A primary contribution of the paper is to point to the apparent psychological gains to all citizens from the welfare state (not merely gains to those receiving actual help and payments from the welfare state). Later findings suggest to us that the welfare state could be thought of more in such a way—i.e., as a provider of ex ante benefits—than is conventional in newspapers and in TV political discussion. One backdrop makes that particularly relevant. The present paper provides evidence that feelings of worry are increasing in Western Europe. It attempts to understand both the statistical predictors of worry at the personal level and also what explains aggregate movements in worry at the national level. In its Supporting Information, which is available in the Appendix S1, the analysis is extended to an examination of 28 OECD countries.

2 | Background

There is a large modern empirical literature on the study of human wellbeing (including Easterlin 2003; Blanchflower and Oswald 2004; Dolan and Kahneman 2007; Pacek and Radcliff 2008; Stone et al. 2010; Layard 2011; Diener et al. 2018; Greve 2017; Clark 2018; Blanchflower and Oswald 2020; Macchia 2022; Daly and Macchia 2023; Zhang, Gagne, et al. 2023). No previous work appears to offer the form of evidence set out later.

However, three important sub-field scientific traditions should be mentioned. One is a literature on economic insecurity (Osberg and Sharpe 2002, 2005, 2014; D'Ambrosio and Rohde 2014; Espinosa et al. 2014; Rebecchi and Rohde 2023; Clark 2024; Derndorfer 2025). Another is a long line of work in psychiatry (Spitzer et al. 2006) on what is viewed as a clinically serious level of worry, namely, the mental illness denoted Generalized Anxiety Disorder (GAD). A third is the recent literature on so-called climate anxiety (Clayton 2020, 2021; Crandon et al. 2022; Martin et al. 2023). Later analysis is a complement to, and will only touch upon issues raised within the first of these two literatures. The central focus in the current paper is on generalized worry in the population rather than on economic worry solely or on mental illness, but it will overlap with the economic element in the first and the third of these prior sets of writing.

The current paper's analysis is not a study of worry about a particular topic (fear of illness, fear of nuclear war, fear of job loss, etc.). Nor do we address the debate about whether there is a “finite pool” of worry inside a typical person (Sisco et al. 2023).

This paper uses annual cross-national data from the Gallup Organization, and in particular pooled data from the question asked of randomly selected individuals, “Did you experience the following feelings during a lot of the day yesterday? . . . Worry?” where respondents could answer *Yes* or *No*. There will thus be no later use of cardinal scores of the sort in Likert Scales (which are open to some critics' claims that feelings cannot be reliably represented by a numerical scale). Instead, the principal variables will be, *at the individual level*, whether a person answers yes or no to the question above, and, *at the societal level*, the aggregate percentage of the population who report that they worry (the original yes (1) or no (0) measure was multiplied by 100 to create the percentage of the people reporting high levels of worry). Later

sections will, for ease of reading, rely on linear probability models, but the results go through for ordered estimators. Here, we study especially but not exclusively 14 Western European nations ($N = 173,996$).

The determinants of worry in modern society are presumably of importance if the aim of researchers and policy-makers is to understand human progress—and especially to move decisively beyond information on indirect markers like Gross Domestic Product (as recently recommended by Zhang, Prettnner, et al. 2023). As with other data on human feelings, it could be asserted that worry data are subjective—although recent work by Kaiser and Oswald (2022) reveals the strong predictive power of data on human feelings—and that linguistic usage might change in a way that could lead to biased inferences across long periods of time. Here we work with data over no more than two decades. The trends in worry will be shown to vary across countries in a way inconsistent with simple claims of linguistic alteration across time.

3 | Previous Literature

In comparison to a cross-disciplinary literature that uses conventional gauges of wellbeing, such as levels of life satisfaction and happiness, the analysis of worry has not been common. Nevertheless, some prior research with versions of these Gallup data has been done.

Jorm and Mulder (2022) showed in cross-sectional analysis that worry levels tend to be lower in nations with high human development and effective government. Helliwell and Yang (2015) demonstrated that worry levels are lower at weekends. Deaton and Arora (2009) established that taller women tend to worry more. Zhou and Guo (2021) showed a strong link between social factors and worry about COVID-19 in China. Stone et al. (2010) and Blanchflower (2020) documented a midlife peak in worry. Macchia and Oswald (2021) argued that economic worry can lead to physical pain. Using US data, Kobayashi et al. (2019) found no statistically significant effects from expansions in health-care cover. Hagen et al. (2022) concluded that high unemployment in a state of the US is associated with greater worry among citizens who live in that state. Kotakorpi and Laamanen (2010) demonstrated that, by combining local-level data on public health care and individual-level data on life satisfaction, it is possible to show in data from the United States that relatively high expenditures in health care have a positive effect on individuals' life satisfaction.

Brodeur et al. (2021) linked COVID-19 to various unhappy behaviors and poor wellbeing. Other related work is Tay et al. (2014), on the potentially harmful comparison effects of living in a rich society; Melios et al. (2023), which examined the statistical determinants of exceptionally low wellbeing in 164 nations; and Daly and Macchia (2023), which established that a measure of distress in 113 countries is going up through time.

Although worry per se is not studied by any of these authors, it is, in all three of the latter articles, a constituent that is bundled within an aggregated measure of misery or negative affect (Daly and Macchia 2023 have it as one element in their

distress index, but the others, which dominate their index, are not forward-looking). Tay et al. and Melios et al. include a covariate for Gross Domestic Product (GDP) in their regression equations, but beyond that neither Tay et al. nor Melios et al., nor Daly and Macchia, attempt to calculate the potential country-level determinants of their chosen aggregate measures of mental ill-being.

The single previous work that is perhaps closest in spirit to the current study—although it does not use data on worry per se—is recent research by Easterlin and O'Connor (2022). The authors offer evidence that patterns over time in European happiness scores are best explained by the countries' different welfare-state policies. Another prior study should be mentioned here. At the microeconomic level, using German data, there is recent work by Rohrer et al. (2021). The authors study different forms of worry and find, among other results, that all kinds of worry seem to increase steadily with a person's age. They also show—as we confirm later—that rises in the unemployment rate appear to be a trigger for greater worry. Stone et al. (2010) in cross-sectional US data conclude that worry is hill-shaped throughout life and peaks around the age of 50.

4 | Data and Methods

The Gallup World Poll (GWP) is a nationally representative, cross-sectional dataset with data from 168 countries and territories from years covering 2005 to 2022. It should be emphasized that we do not have longitudinal data on individuals. Nevertheless, by aggregating the representative cross-sections appropriately, the dataset allows the construction of what can be viewed as a panel of nations. To make the comparison of worry across years more robust, we decided, in order to err on the side of caution, not to work with an unbalanced panel of countries in which certain nations appeared in some years and not in others. Hence, we worked with a balanced panel with countries (14 in the case of Western Europe) that had relevant information in every recent year.

For two reasons, the statistical analysis often focuses on data from 2010 to 2019. This is because, first, the number of available countries is significantly smaller before 2010 and, second, because the unusual pandemic of COVID-19 struck the world after 2019. Our main dataset for Western Europe is for: Austria, Belgium, Denmark, Finland, France, Germany, Ireland, Italy, Luxembourg, Netherlands, Portugal, Spain, Sweden, and the United Kingdom ($N = 173,996$). These nations have the analytical advantage, for our purpose, that they are fairly homogenous in their economic characteristics and cultures. Nevertheless, the Appendix S1 generalizes the analysis to 28 OECD countries of a more heterogeneous kind from 2010 to 2019 ($N = 313,359$). The data set used for that is thus larger. It includes the following: Austria, Belgium, Canada, Colombia, Costa Rica, Denmark, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Japan, South Korea, Lithuania, Luxembourg, Mexico, Netherlands, New Zealand, Poland, Portugal, Slovakia, Slovenia, Spain, Sweden, United Kingdom, and United States. Gallup interviews around 1000 individuals in each country every year. In countries where telephone coverage represents at least 80% of the population, telephone surveys are conducted.

In this paper's formal analysis, we make particular use of the following variables.

4.1 | Worry

The GWP asked respondents “Did you experience the following feelings during A LOT OF THE DAY yesterday? How about Worry?” and could answer Yes or No. This variable was multiplied by 100 to create the percentage of people reporting that they experience worry.

4.2 | Demographic Variables

The GWP also provides respondents' demographic characteristics including age, gender, employment status, level of education, marital status, income quintiles, and number of children under 15 in the household.

4.3 | Government Spending (% of GDP)

This variable indicates the size of government across countries by highlighting the variety of countries' approaches to delivering public goods and services and providing social protection. This variable was retrieved from the OECD database (<https://www.oecd.org/en/data/indicators/general-government-spending.html>).

4.4 | Social Spending (% of GDP)

This variable includes cash benefits, direct in-kind provision of goods and services, and tax breaks with social purposes, and it was also retrieved from the OECD database (<https://www.oecd.org/en/data/indicators/social-spending.html>).

4.5 | Internet Users (% of Population)

This variable indicates the percentage of individuals using the internet in each country and year. This indicator was retrieved from the World Bank database (<https://data.worldbank.org>).

4.6 | Macroeconomic Indicators

The World Bank database also contains the macroeconomic indicators used in later analyses, including the unemployment rate (%), the inflation rate (%), and the log of Gross Domestic Product per capita.

4.7 | Terrestrial Air Temperature (°C)

A measure of gridded terrestrial air temperature was adapted from Willmott-Matsuura data to represent the average temperature in each country and year: <https://climatedataguide.ucar.edu/climate-data/global-land-precipitation-and-temperature-willmott-matsuura-university-delaware>. The average temperature in the three years prior to the start of our period of analyses, 2010, was used in later analyses.

4.8 | Global Warming

The GWP asked respondents, “Temperature rise is a part of global warming or climate change. Do you think rising temperatures are (1) A result of human activities, (2) A result of natural causes, or (3) Both?” We combined categories 1 and 3 into a single category that represents whether people believed that global warming was caused by humans in whole or in part. The second category, “a result of natural causes,” was the reference category in later analyses.

4.9 | Temperature Anomalies

This variable indicates the size of the air temperature anomaly—the level reached above the historical average—in each country and year and was obtained from Berkeley Earth by special request from us (<https://berkeleyearth.org/data/>). The Appendix S2 includes a further check using a variable for Number of Hot Days.

We used Ordinary Least Squares (OLS) regressions with, in some specifications for the Figures themselves, a linear term indicating the survey year as the independent variable. The links between worry and the macroeconomic indicators, a variable for social spending, and variables for air temperature, temperature anomalies, and the percentage of people using the internet are studied.

In the models that examine the micro data, and as an equivalent alternative to multi-level modeling, we clustered the standard errors at the country-year level to account for the different levels of aggregation between the dependent variable (which is worry as measured for each individual) and the country-level independent variables (measured in each nation in each year). These models also included country and year fixed effects to account for

unobserved country-specific and time-specific aspects that could influence worry, as well as controls for respondents’ personal and demographic characteristics. The result is a statistical approach that corresponds to the analysis of a panel of nations.

The interrelationship between worry and global warming—using temperature “anomaly” data—was also probed by estimating OLS regressions with country-year fixed effects and demographic characteristics as covariates.

5 | Results

This section summarizes our findings for the West European nations. For background, a collection of supplementary kinds of material, largely for an OECD sample of countries, is given in the Appendix. Table A1, for example, reports the mean levels of worry for citizens of the rich European nations. Females report slightly higher worry than males, at approximately 35% of all women compared to 31% of men. The gap between the worry proportions for those with low and high education is large, at approximately 42%–31%. A substantial difference, of six percentage points, is also found between those people who earn low and high income. Differences are comparatively small, however, for the married versus the non-married and for the employed versus the non-employed.

The first substantive result in this paper is depicted in Panel A of Figure 1. It reveals an upward trend in worry levels for this sample of 14 European nations from 2005 to 2022. The vertical axis is a percentage of citizens. Here the unadjusted gradient of the best-fitting line is approximately 0.5, with a small standard error, which implies that every 2 years another one percentage point of the population converts to the proportion of individuals who answer “Yes” to a question asking whether they worried for

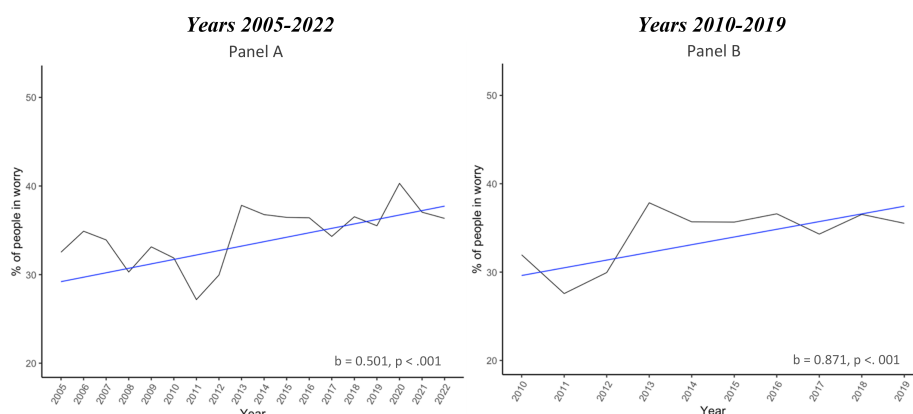


FIGURE 1 | The Unadjusted Upward Trend in Extreme Levels of Worry, Western Europe, 2005–2022 (Panel A) and 2010–2019 (Panel B). Panel A: Sample size was 288,262. Panel B: Sample size was 173,996. These are simple plots of the raw means in the data set; here and in later figures the standard errors for the fitted trend line are in effect thus clustered at the year level (the dependent variable is a single aggregated measure). Wording of the worry question: *Did you experience the following ... during A LOT OF THE DAY yesterday? How about ... Worry? Yes/no.* This measure is multiplied here by 100 to create the percentage of people reporting high levels of worry. 14 Western European countries: Austria, Belgium, Denmark, Finland, France, Germany, Ireland, Italy, Luxembourg, Netherlands, Portugal, Spain, Sweden, United Kingdom. Missing country-year combinations in Panel A: Austria 2005, Austria 2007, Austria 2009, Belgium 2006, Belgium 2009, Denmark 2006, Finland 2005, Finland 2007, Finland 2009, France 2007, Germany 2006, Ireland 2005, Ireland 2007, Italy 2006, Luxembourg 2005, Luxembourg 2006, Luxembourg 2007, Luxembourg 2008, Luxembourg 2020, Luxembourg 2021, Netherlands 2006, Netherlands 2009, Portugal 2005, Portugal 2007, Portugal 2009, Spain 2006, Sweden 2006, United Kingdom 2006. Missing country-year combinations in Panel B: Luxembourg 2020, Luxembourg 2021.

a lot of the time during the previous day. The upward trend line ends just below 40% of the population.

Panel A in Figure 1 may not be completely reliable because it is based on an unbalanced sample of nations (i.e., some nations are missing for certain years) and it includes the presumably exceptional COVID-19 period of 2020 onwards. Panel B in Figure 1 therefore switches to the period 2010–2019. This makes it possible to work with a balanced sample of the same nations each year and it means that the underlying trend can be checked when the COVID-19 years are (deliberately) omitted. This is the time sample used in later regression equations. Panel A in Figure 1's gradient is steeper than in the earlier diagram at approximately 0.9, which implies that in each year just under one percentage point of the population converts to the proportion of individuals who answer Yes to a question asking whether they worried for a lot of the time during the previous day. However, it should be noted that it is not true that every country exhibits an increase in national worry. Table A2 in the Appendix shows that Finland, the Netherlands, Sweden, and especially Spain have flat or declining levels through time.

Tables 1–3 provide fixed-effects regression equations that make it possible to explore in a longitudinal country panel the patterns in the West European sample. The aim is to uncover the micro predictors of personal worry and to attempt at the macro level to probe the possible reasons for the upward trend through time in this group of nations. Initially, the regression equations in the first two columns of Table 1 include covariates for: reported gender, where the base reference category is female; a set of 9 different age bands, where the base reference category is adults under age 25; employment status, where the base reference category is being full-time employed; the income quintile of the population in which the individual survey respondent's income lies, where the base reference category is being in the lowest quintile; the education level of the individual, where the base reference category is having only elementary education; the marital status of the individual, where the base reference category is having never been married; a variable for having young children in the household; and a set of country and year dummy variables.

In its first two columns, Table 1 reveals systematic links between greater worry and those who are:

- female
- middle-aged
- unemployed
- employed part-time but wanting a full-time job
- on low income
- having only elementary education
- divorced and separated.

Some of these results are intuitively as expected. The largest estimated effect sizes are, first, on being unemployed (approximately 15 percentage points) and, second, for the difference between being in the third rather than the highest income quintile (approximately 11 percentage points). Having dependent

children in Table 1 is associated with a marginally lower level of worry. There is no significant difference in worry between widowers and those who never married.

Could the national changes in extreme worry in Europe be the result of movements in the macro-economy? Data are available through time and across nations, so a longitudinal balanced-panel analysis is feasible here.

The third column of Table 1, which we believe offers the first estimates of their type in the research literature, introduces three variables of an economic kind: the national unemployment rate, GDP, and the rate of inflation. The rate of unemployment enters with a statistically significant positive coefficient of 0.556. That number implies that an increase in the unemployment rate of one percentage point is associated with a half percentage point rise in those reporting high levels of worry. The GDP variable has a very large standard error. Inflation is positive in the regression equation and statistically significant. Hence, macroeconomic forces, although not GDP, apparently matter for cross-national worry levels. However, we would not wish to make strong claims about GDP. Its relatively smoothly changing nature makes it unlikely that, in a fairly short series of years, it will be straightforward to obtain a reliable estimate of the coefficient. We checked and verified that if the GDP variable is omitted from all our equations, the critical conclusions of the paper are essentially unaffected.

It should be noted that in Table 1 there is evidence—because the equation includes a variable for personal unemployment—that the unemployment rate in a country must correlate with citizens' worries in some kind of background or subconscious way. In a labor market downturn, it is apparently not just the unemployed themselves who worry.

Interestingly, the inclusion in the formal analysis of people's personal characteristics and the three macroeconomic variables does not greatly alter Panel B in Figure 1's time trend (of 0.871) that is found in the raw unadjusted data. The time trend in Panel A in Figure 2, which gives an adjusted time-gradient estimate using the equation in column 3 of Table 1, is 0.736. The fact that this number lies below 0.871 implies that the additional variables have increased (although only slightly) the extent of the unexplained upward trend in European worry. This is, in part, because unemployment and inflation levels in some countries declined through the decade, so that may have helped to moderate the unadjusted observed trend in worry through time. Macroeconomic forces cannot explain the secular trend in national worry. In passing, it should be mentioned that the trend in high levels of worry also cannot be explained by the existence of an aging population (because older people tend in the data to report a comparatively low degree of worry).

As background, it should be recorded that, on average, in Western Europe (i) GDP has trended upwards over the period, (ii) inflation and unemployment rates have both trended down, and (iii) social spending levels have run approximately flat.

Influenced by sources such as Easterlin and O'Connor (2022), which argued that recent differences among European countries in happiness have been due to the differences in the generosity of

TABLE 1 | Extreme-Worry Equations, Western Europe, 2010–2019.

	<i>Dependent variable: % of people reporting high levels of worry</i>		
	(1)	(2)	(3)
Unemployment rate	—	—	0.556** (0.267)
Log of GDP per capita	—	—	4.771 (8.744)
Inflation rate	—	—	1.142* (0.588)
Male	−4.560*** (0.221)	−3.616*** (0.225)	−3.629*** (0.301)
Age band (<i>Ref.: 15–24 years old</i>)			
25–34	4.068*** (0.474)	7.734*** (0.502)	7.702*** (0.585)
35–44	4.526*** (0.449)	8.870*** (0.511)	8.846*** (0.638)
45–54	4.593*** (0.439)	8.759*** (0.507)	8.729*** (0.700)
55–64	0.856* (0.442)	4.693*** (0.519)	4.650*** (0.806)
65–74	−3.750*** (0.458)	−1.111** (0.557)	−1.168 (1.042)
75–84	−3.321*** (0.565)	−1.593** (0.668)	−1.657 (1.139)
85–94	−4.338*** (1.082)	−3.047*** (1.154)	−3.077** (1.481)
95–100	−0.006 (1.731)	2.536 (1.736)	2.497 (1.930)
Employment Status (<i>Ref.: Employed full-time for an employer</i>)			
Employed full-time for self	—	3.631*** (0.466)	3.652*** (0.542)
Employed part-time want full-time	—	7.270*** (0.534)	7.289*** (0.624)
Employed part-time do not want full-time	—	0.405 (0.423)	0.428 (0.604)
Unemployed	—	15.085*** (0.576)	15.002*** (0.731)
Out of workforce	—	3.931*** (0.320)	3.945*** (0.436)
Income quintile (<i>Ref.: Bottom 20%</i>)			
Second 20%	—	4.062*** (1.413)	3.903** (1.768)
Third 20%	—	6.085*** (1.069)	5.947*** (1.180)
Fourth 20%	—	1.533 (0.993)	1.536 (1.189)

(Continues)

TABLE 1 | (Continued)

	Dependent variable: % of people reporting high levels of worry		
	(1)	(2)	(3)
Top 20%	—	−5.182*** (0.981)	−5.157*** (1.286)
Level of education (<i>Ref.: Elementary</i>)			
Secondary	—	−1.973*** (0.399)	−1.927*** (0.510)
Tertiary	—	−1.948*** (0.439)	−1.888*** (0.592)
Marital status (<i>Ref.: Single/never married</i>)			
Domestic partner	—	−0.046 (0.460)	−0.023 (0.540)
Married	—	−2.165*** (0.334)	−2.171*** (0.442)
Separated	—	7.769*** (0.809)	7.756*** (0.908)
Divorced	—	4.211*** (0.504)	4.232*** (0.480)
Widowed	—	0.559 (0.535)	0.557 (0.706)
Children under 15 in the household	—	−0.508*** (0.150)	−0.509*** (0.193)
Country fixed effects	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes
Constant	22.128*** (0.653)	21.585*** (1.235)	−35.455 (95.595)
N	173,996	173,996	173,996
R ²	0.053	0.067	0.068

Note: These equations, and later ones, can be thought of as aggregating the representative micro-level data to allow us to study some country-level variables (in this case, the unemployment rate, GDP, and the inflation rate). Models show unstandardized OLS coefficients, with standard errors clustered by country-year in parentheses.

Mean (SD) % of people reporting high levels of worry = 32.98 (47.02).

Fourteen Western European countries included in all models.

Wording of the worry question: *Did you experience the following ... during A LOT OF THE DAY yesterday? How about ... Worry? Yes/no.* This measure was multiplied by 100 to create the percentage of people reporting high levels of worry.

* $p < 0.1$. ** $p < 0.05$. *** $p < 0.01$.

their welfare states, the specifications in Table 2 explore whether national worry might be associated with the extent of social spending and government spending policies. One previous study is potentially consistent with that. Di Tella et al. (2003) found in a country panel that the happiness of nations was longitudinally linked to the generosity of a nation's unemployment benefit system. The current paper also explores whether the growth of the internet could have played a role in the pattern of worry through time—perhaps by raising stress levels or alternatively in a positive way by improving communication.

Table 2 contains a noteworthy result. In the second column of Table 2, a variable for social spending, which is defined here as the proportion of GDP that goes on national spending for

social purposes, enters strongly and with a positive sign and small standard error. Here we are using a measure constructed by the OECD. The OECD describes the makeup of the variable in the following way (for precision, the later sentences are taken verbatim from the OECD description): Social expenditure comprises cash benefits, direct in-kind provision of goods and services, and tax breaks with social purposes. Benefits may be targeted at low-income households, the elderly, disabled, sick, unemployed, or young persons. To be considered “social”, programs have to involve either redistribution of resources across households or compulsory participation. Social benefits are classified as public when general government (i.e., central, state, and local governments, including social security funds) controls the relevant financial flows. All social benefits not provided by general

TABLE 2 | Extreme worry, government spending, social spending, and internet users percent, Western Europe, 2010–2019.

	<i>Dependent variable: % of people reporting high levels of worry</i>		
	(1)	(2)	(3)
Government spending	–0.241 (0.282)	—	—
Social spending	—	–1.803*** (0.600)	—
Internet users	—	—	0.132 (0.122)
Unemployment rate	0.631* (0.336)	0.639** (0.322)	0.719** (0.318)
Log of GDP per capita	–3.407 (36.912)	–36.850 (37.271)	7.003 (9.096)
Inflation rate	1.313* (0.676)	1.241** (0.614)	1.281** (0.597)
Personal characteristics	Yes	Yes	Yes
Country fixed effects	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes
Constant	65.531 (408.946)	466.655 (416.035)	–70.886 (102.190)
<i>N</i>	164,127	164,127	173,996
<i>R</i> ²	0.070	0.070	0.068

Note: Models show unstandardized OLS coefficients, with standard errors clustered by country-year in parentheses.

Personal characteristics: Gender, age bands, employment status, income quintiles, level of education, marital status, number of children under 15 in the household. Full models can be found in Table A3.

Mean (SD) % of people reporting high levels of worry = 32.98 (47.02).

Columns 1 and 2 include the following countries: Austria, Belgium, Denmark, Finland, France, Germany, Italy, Luxembourg, Netherlands, Portugal, Spain, Sweden, United Kingdom.

Column 3 includes all 14 Western countries.

Wording of the worry question: *Did you experience the following ... during A LOT OF THE DAY yesterday? How about ... Worry? Yes/no.* This measure was multiplied by 100 to create the percentage of people reporting high levels of worry.

Government spending (% of GDP) indicates the size of government across countries by highlighting the variety of countries' approaches to delivering public goods and services and providing social protection. Mean = 48.32, Std. Dev. = 4.76.

Social spending (% of GDP) includes cash benefits, direct in-kind provision of goods and services, and tax breaks with social purposes. Mean = 25.33, Std. Dev. = 3.53.

Internet users indicates the percentage of individuals using the internet in each country and year. Mean = 83.13, Std. Dev. = 10.14.

p* < 0.1. *p* < 0.05. ****p* < 0.01.

government are considered private. Private transfers between households are not considered as “social” and not included. Net total social expenditure includes both public and private expenditure. It also accounts for the effect of the tax system by direct and indirect taxation and by tax breaks for social purposes. This indicator is measured as a percentage of GDP.

Neither government spending nor the variable for the percentage of internet users plays a statistically significant role in Table 2.

The estimate on the coefficient on social spending in the second column of Table 2 is –1.803. That implies a substantial estimated effect size. A one percentage point rise in the proportion of GDP going on social spending is associated in the data with a drop of almost two percentage points in the proportion of the population who say they experience a lot of worry.

Such a finding is potentially consistent with the existence of an influential role for the welfare state (i.e., social spending may

be a force that diminishes citizens' fears in society). To anticipate different possible interpretations of this statistical result, three points are relevant. First, the national unemployment rate is effectively held constant in the regression equations of Table 2, so the coefficient on social spending is not merely erroneously standing in for the role of business-cycle movements. Second, an estimate of –1.803 of this sort cannot easily be ascribed to standard forms of simultaneity bias. If citizens worried a lot as they entered hard times, where they felt they were relying more and more on social spending, then the opposite sign would be expected: worry and social spending would be positively correlated. Third, if the equation is re-estimated and the social spending variable is instead lagged by either 1 or 2 years, then, encouragingly, it continues to enter with a positive and statistically significant coefficient. Hence, reductions in social spending are followed by later worsening levels of worry. This is shown in Table 3.

Are different age-groups in the population affected in the same or in different ways by alterations in social spending? Table 4 offers

TABLE 3 | Worry and lags of social spending, Western Europe, 2010–2019.

	<i>Dependent variable: % of people reporting high levels of worry</i>		
	(1)	(2)	(3)
Social spending at t	—	—	−1.537* (0.859)
Social spending at $t-1$	−1.465** (0.602)	—	−0.224 (1.200)
Social spending at $t-2$	—	−0.851* (0.475)	−0.170 (0.750)
Unemployment rate	0.799** (0.319)	0.690** (0.324)	0.684** (0.330)
Log of GDP per capita	−17.010 (36.173)	−2.896 (34.215)	−35.674 (37.310)
Inflation rate	0.963 (0.655)	0.978 (0.665)	1.151* (0.624)
Personal characteristics	Yes	Yes	Yes
Country fixed effects	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes
Constant	241.447 (402.338)	69.527 (376.830)	457.033 (417.303)
N	164,127	164,127	164,127
R^2	0.070	0.070	0.070

Note: Models show unstandardized OLS coefficients, with standard errors clustered by country-year in parentheses.

Personal characteristics: Gender, age bands, employment status, income quintiles, level of education, marital status, number of children under 15 in the household. Full models can be found in Table A4.

Mean (SD) % of people reporting high levels of worry = 33.15 (47.07).

Models include the following countries: Austria, Belgium, Denmark, Finland, France, Germany, Italy, Luxembourg, Netherlands, Portugal, Spain, Sweden, United Kingdom.

Wording of the worry question: *Did you experience the following ... during A LOT OF THE DAY yesterday? How about ... Worry? Yes/no.* This measure was multiplied by 100 to create the percentage of people reporting high levels of worry.

Social spending (% of GDP) includes cash benefits, direct in-kind provision of goods and services, and tax breaks with social purposes.

* $p < 0.1$. ** $p < 0.05$. *** $p < 0.01$.

evidence on that issue. It reveals that older age-groups are more greatly affected—though the equation for the youngest group in Table 4 continues to have a negative coefficient—by the amount of social spending in a country. One possibility is that the young depend intrinsically less on the state and on particular parts of the public sector, including less on healthcare provision.

Panel B in Figure 2 demonstrates that, after adjustment for social spending, the time trend in national worry is 1.101. This can be compared with the trend of 0.736 in Panel A in Figure 2 (adjusted, but not for social spending) and of 0.871 in Panel B in Figure 1 (unadjusted). It may be scientifically prudent to view these cautiously as being all estimates of approximately a unit gradient of 1.0. That is, as each year passes, on average, an additional one percentage point of the population moves into the extreme-worry category.

The social-spending finding therefore does not alter the fact that in an underlying sense there remains an intrinsic upward trend in levels of worry within the rich European nations. If anything, the finding might be said to sharpen that conclusion because 0.736

lies below 1.101. The difference in estimates is consistent with the idea that social spending has helped to reduce the observed upward trend below the implied raw trend. It acts to ameliorate some of the impact of whatever is driving rich, safe citizens through time to worry about the future.

A further possibility is that climate-change fear is what is increasingly weighing psychologically upon the citizens of Western Europe. The first way to probe that hypothesis is to look at the baseline temperatures in different countries to see if it is those hotter places that appear to have an inherently faster incline in worry through time—as they are likely to be worst affected by global warming. Figure A1 in the Appendix can uncover little empirical support for that idea; the correlation is close to negligible.

A more complex and appropriate kind of check is offered in Tables A5a, A5b in the Appendix. Here the first key independent variable is the annual temperature ‘anomaly’, namely, the extent of the size divergence of above normal temperature in that country (we use a measure produced by the University of California,

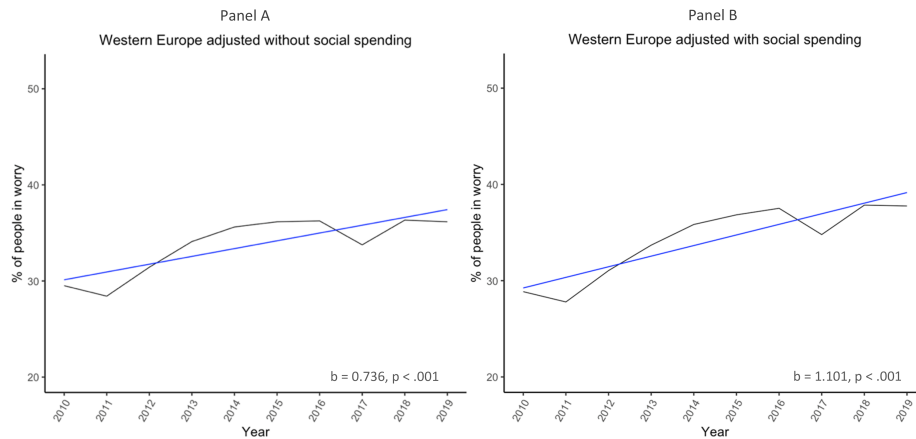


FIGURE 2 | Extreme-Worry Trend after Adjustment for Macroeconomic Variables (Panel A), and for Macroeconomic Variables and Social Spending (Panel B), Western Europe, both panels here are for 2010–2019. Panel A: Sample size was 173,996. The graph depicts the time trend adjusted for gender, age bands, employment status, income quintiles, level of education, marital status, number of children under 15 in the household, log of GDP per capita, unemployment rate, inflation rate, and country fixed effects. This is based on regression 3 in Table 1. Panel B: 173,996. The graph depicts the time trend adjusted for gender, age bands, employment status, income quintiles, level of education, marital status, number of children under 15 in the household, Social Spending, log of GDP per capita, unemployment rate, inflation rate, and country fixed effects. Standard errors were clustered at the country-year level. This diagram is based on regression 2 in Table 2. Wording of the worry question: *Did you experience the following ... during A LOT OF THE DAY yesterday? How about ... Worry? Yes/no.* This measure was multiplied by 100 to create the percentage of people reporting high levels of worry. 14 Western European countries: Austria, Belgium, Denmark, Finland, France, Germany, Ireland, Italy, Luxembourg, Netherlands, Portugal, Spain, Sweden, United Kingdom. This is based on regression 3 in Table 2. It is not possible to do this calculation for the full period 2005–2022.

TABLE 4 | Worry and social spending in age subsamples, Western Europe, 2010–2019.

	Dependent variable: % of people reporting high levels of worry		
	Age under 40(1)	40–60(2)	Over 60(3)
Social spending at t	−1.055 (0.660)	−1.306** (0.633)	−2.798*** (0.944)
Unemployment rate	0.885** (0.399)	0.430 (0.431)	0.542 (0.424)
Log of GDP per capita	18.110 (43.016)	−55.212 (39.127)	−65.952 (45.837)
Inflation rate	0.657 (0.760)	1.816** (0.786)	1.025 (0.780)
Personal characteristics	Yes	Yes	Yes
Country fixed effects	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes
Constant	−150.074 (480.699)	658.464 (435.465)	817.130 (514.228)
N	47,892	61,771	54,464
R^2	0.050	0.075	0.079

Note: Models show unstandardized OLS coefficients, with standard errors clustered by country-year in parentheses.

Personal characteristics: Gender, employment status, income quintiles, level of education, marital status, number of children under 15 in the household. Full models can be found in Table A4.

Models include the following countries: Austria, Belgium, Denmark, Finland, France, Germany, Italy, Luxembourg, Netherlands, Portugal, Spain, Sweden, United Kingdom.

Wording of the worry question: *Did you experience the following ... during A LOT OF THE DAY yesterday? How about ... Worry? Yes/no.* This measure was multiplied by 100 to create the percentage of people reporting high levels of worry.

Social spending (% of GDP) includes cash benefits, direct in-kind provision of goods and services, and tax breaks with social purposes.

* $p < 0.1$. ** $p < 0.05$. *** $p < 0.01$.

Berkeley). Nevertheless, Table A5a does not find that such a variable, even if lagged and averaged over recent years, works in a statistically persuasive way. There is even a hint of a positive effect size in the first column of Table A5a. Table A5b is similar in its null implications but uses a hot-days measure as an alternative independent variable. A study of a different kind also recently failed to find clear effects (Hailemariam et al. 2023).

Finally, Table A6 in the Appendix exploits a little-known survey question that was asked by Gallup in the year 2010 (although not in any other year): “Temperature rise is a part of global warming or climate change. Do you think rising temperatures are: A result of human activities **or** A result of natural causes **or** Both?” For the single year of 2010, therefore, it is possible to estimate a worry equation in which

answers to this question can be entered as an independent variable.

It can be seen in Table A6 that believing in human-made climate change is associated with statistically higher levels of worry. The effect size is not large (at approximately 2 extra percentage points) but it appears, in the second column of Table A6, to be robust to the inclusion of many other independent variables. Such a finding, which we believe is a new one not known to researchers, has the scientific advantage that the survey worry question is asked first and does not directly “prime” a survey respondent to think about their potential fears over the altering climate.

6 | Discussion

This paper offers four contributions.

First, and as background, it documents a systematic and little-known secular rise in “national worry” through time within modern West European society. The UK exhibits the greatest increase in our sample of nations. Second, it estimates the patterns of worry across different sorts of individuals (females, the unemployed, those with low levels of education, the separated and divorced, the middle-aged, among others—all express greater levels of worry). Third, it shows that worry levels move with economic variables, particularly unemployment and inflation. Fourth, it presents new evidence on social spending that is consistent with an intuitive—see the previous ideas of Osberg and Sharpe (2014)—but arguably rarely emphasized psychological benefit from a welfare state. As well as playing its familiar and well-understood role in acting to supplement incomes in difficult times, the welfare state can provide a form of mental insurance and an emotional bulwark against insecurity (perhaps an aggregation of insecurity about income, work, and housing; see also Clark 2024, Keene et al. 2018).

James Griffiths, as pointed out by Harris and Fraser (2024), stated in 1943 that “the Beveridge plan has become ... a symbol of the kind of Britain we are determined to build ... a Britain in which the mass of the people shall be ensured security from preventable want” (House of Commons Debates, 18 February 1943, col. 1965). One aspect of security is, in an *ex ante* sense, reduced fear and worry.

There is a strong connection in our data between extreme worry and the state of the macro-economy. It seems possible that there are also profound links between national worry and national levels of “hope,” as in Carol Graham’s recent work (Graham 2017, 2023; Graham et al. 2017), but we have been unable to explore them here. The broad vision that lies behind much of this paper’s analysis is that—as in recent writings in political science such as Iversen and Soskice (2001)—the state can act as a smoothen of individual risks.

The study’s ideas seem to sit naturally with the conceptual notion that a welfare state reduces subconscious “fear” among a society’s citizens by providing a backstop against disability, joblessness, ill health, and threat of crime, among others (e.g., Craig 2024; Hecht et al. 2024). The reduction of worry might aid the harmful biological consequences of negative affect and stress

(Kristenson et al. 2004; Chrousos 2009; Fisher and Baum 2010; Thoits 2010).

It has not been possible here to establish what is predominantly causing the underlying annual increases in the amount of worry in industrialized countries. This is a limitation to our work. We have not found good evidence that suggests it is due to apprehension over climate change (which had been one hypothesis in our minds), although in Table A6 in the Appendix our analysis documents a new and potentially valuable result about a cross-sectional link, in earlier data, between general worry and belief in anthropogenic climate change. Nor could we find discernible evidence of a connection between national worry and the growth of the internet. Nor can the secular trend in extreme worry be explained by an aging population: the old report comparatively low levels of worry. Due to the comparatively small number of data points in the social spending data in each country, we could not obtain country-level estimates. That, if it became feasible in the future, might help shed light on the role of different types of welfare states in the reduction of national levels of worry.

Finally, a referee has pointed out that we may be estimating a lower bound of the correlation between social spending and worry. Worry might be a general marker of malaise in a society, and social spending might increase in response to such malaise. Reverse causality implies a positive relationship, rather than the negative one that we estimate.

7 | Conclusion

This paper opens by showing that large numbers of citizens in Western Europe suffer from high levels of worry. These nations are among the safest and most prosperous in history. That makes the phenomenon documented in this paper a perplexing and disquieting one. A substantial worry time trend is also evident in the data. Importantly, that trend predates the influence of the COVID pandemic period. Similar patterns hold true of the OECD as a whole (those results are given in the Appendix S2), although the overall rate of increase is slightly slower.

Against this troubling background, a potentially important finding from the regression-analysis section of the paper is that reductions in social spending are a statistical predictor of contemporaneous and future rises in national worry levels. Perhaps notably, the UK has had the largest reduction in social spending in Western Europe (Table 5) and the greatest increase in worry.

This paper has a weakness that should be emphasized. The evidence here draws upon observational data and is correlational in nature. Its relative strengths and weaknesses should therefore be weighed carefully. Our analysis is consistent in spirit, however, with the kinds of parallel arguments put forward by Easterlin and O’Connor (2022), and in an early article by Di Tella et al. (2003). Those research articles conclude for European data that changes in the generosity of welfare state programs help statistically to explain the observed changes in national happiness. Our view is that the issues are sufficiently important and complex that different types of complementary evidence, including correlational patterns, are valuable.

TABLE 5 | Time trend in social spending by country, Western Europe, 2010–2019.

Country	Social spending trend
Austria	−0.004
Belgium	0.054
Denmark	−0.191
Finland	0.265
France	0.014
Germany	0.071
Ireland	No data
Italy	0.095
Luxembourg	−0.001
Netherlands	−0.165
Portugal	−0.247
Spain	−0.162
Sweden	−0.047
United Kingdom	−0.462

These issues—especially the unexplained and ongoing increase in worry—are central to the future of modern society. We believe they demand further attention.

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Ethics Statement

The submission complies with Wiley's Best Practice Guidelines on Research Integrity and Publishing Ethics and the Committee on Publication Ethics.

Conflicts of Interest

The authors declare no conflicts of interest.

Data Availability Statement

The data that support the findings of this study are available from Gallup. Restrictions apply to the availability of these data, which were used under license for this study.

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Supporting Information

Additional supporting information can be found online in the Supporting Information section. **Data S1:** Supporting Information. **Data S2:** Supporting Information.