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DISCUSSION PAPER

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COVID-19 and the Formation of Energy Conservation Routines: Disentangling the Relative Importance of Attention and Income Shocks

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COVID-19 and the Formation of Energy Conservation Routines: Disentangling the Relative Importance of Attention and Income Shocks

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We examine the impact of the COVID-19 pandemic on the formation of energy conservation routines. To do so, we use data from two nationwide surveys of German households, conducted before and during the pandemic. Across the two survey waves, we document a significant increase in the likelihood respondents report engaging in a variety of energy conservation routines, such as unplugging electronic appliances after use and switching off lights when leaving a room. To understand what drives this result, we provide evidence that observed energy saving actions reflect an increased attention devoted to energy consumption while staying at home, as opposed to income shocks experienced during the pandemic. We also rule out an increase in pro-environmental concern during the pandemic as driver of our results. Rather, we find evidence consistent with a "finite pool of worry," that might have even limited the impact of increased attention on the adoption of energy saving routines. In sum, our findings highlight the importance of consumer attention for the adoption of conservation routines to fight global climate change in a post-pandemic world.

JEL Classification: D91, Q49, C83

Keywords: Energy conservation routines, COVID-19, income shocks, attention, nationwide surveys

1. Introduction

A number of policymakers and researchers have argued that the recovery from the disruptions caused by the COVID-19 pandemic presents a unique opportunity to expedite climate change mitigation and the transition towards sustainable consumption pathways (Cohen, 2020; European Commission, 2020; Hodges & Jackson, 2020; Pearson et al., 2020; Rosenbloom & Markard, 2020). Yet, whether we are able to make the transition ultimately depends on the persistence of changes in consumer behavior documented during the COVID-19 pandemic (Pearson et al., 2020). This is particularly true for the transition to sustainable energy consumption and reductions in carbon emissions that are a by-product of residential energy consumption. Currently, residential consumers account for approximately 23 percent of total electricity demand across the world (IEA, 2019) and 25 percent in Germany (BDEW, 2020). Hence, changing consumption patterns among residential consumers is necessary if we are to achieve meaningful reductions in global carbon emissions and meet the associated climate targets.

According to the IPCC Sixth Assessment Report changes in lifestyle and routines have the potential to generate meaningful reductions in global carbon emissions ("Action on Demand," 2022; IPCC, 2022). For example, (Creutzig et al., 2022) estimate that conservation actions could lead to reductions in carbon emissions from the building sector in the range of 10 to 40 percent. This holds particularly in the German context, where 54 percent of the population are tenants (Federal Statistical Office of Germany, 2022a). Hence, changes in electricity consumption patterns are more likely to arise through conservation actions, as opposed to large-scale energy efficiency investments in buildings.

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Fortunately, there is a growing body of work showing the promise of this approach; consumers perceive conservation actions such as unplugging appliances or switching off lights, to be the most effective strategies to reduce electricity consumption (Attari et al., 2010) and undertake these actions when nudged towards energy conservation (Allcott, 2011a). Likewise, a number of studies analyze behavioral interventions as measures to promote conservation actions such as switching lights off (Bergquist & Nilsson, 2016; Dwyer et al., 2015; Leoniak & Cwalina, 2019).

To date, there is limited evidence on the effect of the COVID-19 pandemic on consumers' energy conservation actions. For example, U.K. smart meter data document a short-term increase in residential electricity demand during the lock-down restrictions; a change likely driven by increased time spent at home (Le Quéré et al., 2020). Yet, it is unclear what this increased consumption implies for energy conservation strategies. Even with higher observed electricity consumption due to at-home confinements, residential customers may have adopted electricity conservation routines that lead to changes in long-run patterns of energy consumption – i.e., it is possible that the pandemic may have fostered the use of conservation routines that are integral for fighting climate change.

There are at least two reasons why the COVID-19 pandemic may have caused households to develop new routines. First, for many individuals the pandemic led to changes in employment status and associated labor income. Since electricity consumption and income are positively correlated (Schulte & Heindl, 2017), it is reasonable to expect that income reductions during the pandemic could have led to subsequent reductions in electricity consumption. Second, there could be behavioral factors underlying changes in consumption during the pandemic. Specifically, the stay-at-home orders could have increased the salience of energy consumption within the home, and thereby cause a higher awareness of households towards energy conservation. Such an increased awareness, or attention devoted to energy conservation, would be consistent with models of focus, inattention or salience (Bordalo et al., 2013; Cialdini et al., 1991; Gabaix, 2019). The intuition of such models is that the stay-at-home orders reduced the number of available actions in our choice set, leaving fewer actions that attention can be directed to. In sum, both reduced income and increased attention could lead consumers to adopt electricity conservation routines.

This study explores whether and why the COVID-19 pandemic caused individuals to adopt energy conservation routines. Our main results provide evidence that survey respondents developed new routines during the pandemic. Supplemental analysis shows that an increased attention, proxied by an increased time spent at home, rather than income reductions was the main driver of the adoption of energy conservation routines during the pandemic. We are further able to rule out increased pro-environmental concern during the pandemic as driver. Supplementary data suggests a crowding out of environmental concern as COVID-19 cases increase – evidence that is consistent with the theory of a "finite pool of worry." These findings speak to the importance of salience and attention for the adoption of conservation routines.

2. Study design

This study utilizes data from two surveys conducted in Germany, one before and the second during the COVID-19 pandemic. The first survey wave was conducted from December 2017 to January 2018 and includes responses from approximately 700 individuals. The second wave was conducted in May 2020 and includes data from 800 additional participants.[1]

In both waves, we elicited information on participants' energy conservation routines. Specifically, we asked respondents "Do you follow routines in your energy conservation actions?" and allowed them to select among 1) check each room before leaving the house, 2) turn off the light when leaving the room, 3) unplug electronic devices after usage, and 4) other routines designed to conserve electricity. Although

[1] Appendix A gives more details on participant recruitment, sampling frame and survey questions.

we cannot pin down the exact electricity savings corresponding to each action, savings should be positive if at least one member of the household reports one of these actions as a routine. We also elicited basic demographic and socio-economic characteristics, which we use as controls to adjust for potential imbalances in who responds to the survey across the two waves.

In the second wave, we further elicited the extent to which participants' income and daily life was affected by the COVID-19 pandemic and the national lock-down mandates. Specifically, we asked respondents whether they had recently lost their job – either because they were laid off or because their own business had to shut down. We also collected two measures related to changes in contact with others – whether they were currently 'staying-at-home, except to do basic shopping' and if they were currently 'avoiding face-to-face contact with friends and family.' In wave 2, we also elicited a broader set of individual controls, including participants' trust in the national government to manage the COVID-19 pandemic, altruism as reflected by a self-reported measure (Falk et al., 2018), and altruism as reflected by donations in an incentivized modified Dictator Game (Carpenter et al., 2008; List, 2007).

Table 1: Means, standard deviations/errors and number of observations for main variables by wave

	(1) Before COVID-19	(2) During COVID-19	(3) Difference
No. routines (1-4)	1.055	1.747	0.692***
	(0.800)	(1.016)	(0.048)
	692	779	1471
Switch off lights (=1)	0.684	0.774	0.091***
	(0.465)	(0.418)	(0.023)
	692	779	1471
Check each room (=1)	0.147	0.424	0.276***
	(0.355)	(0.494)	(0.023)
	692	779	1471
Unplug appliances (=1)	0.214	0.392	0.178***
	(0.410)	(0.488)	(0.024)
	692	779	1471
Female (=1)	0.530	0.515	-0.015
	(0.499)	(0.500)	(0.026)
	711	802	1513
Age (count)	48.696	48.354	-0.342
	(18.483)	(16.272)	(0.893)
	711	802	1513
No. children (0-5)	0.416	1.023	0.606***
	(0.749)	(1.183)	(0.052)
	711	793	1504
Education (1-7)	3.971	4.586	0.615***
	(1.215)	(1.041)	(0.059)
	681	797	1478
Employed (=1)	0.553	0.556	0.003
	(0.498)	(0.497)	(0.026)
	673	793	1466
Income (1-10)	6.841	6.648	-0.193
	(2.704)	(3.123)	(0.168)
	528	739	1267
Trust (1-5)		3.674	

			(1.308)
			788
Sharing in DG (0-1)			0.487
			(0.318)
			802
Self-reported altruism (0-10)			5.018
			(3.044)
			784
Lost job (=1)			0.131
			(0.338)
			762
Stay at home (=1)			0.710
			(0.454)
			770
Avoid contact friends/family (=1)			0.671
			(0.470)
			769

Note: 'Before COVID-19' data was collected in survey wave 1 in 2018, 'During COVID-19' data was collected in wave 2 in 2020. 'No. routines' denotes the number of reported energy conservation routines, ranging from zero to four. 'Switch off lights', 'Check each room' and 'Unplug appliances' are indicators that are equal to one if the participant reported the respective action as a routine, and zero otherwise. The number of children is top-coded at '5 or more'. Education is a categorical variable with values from 1 'No education' to 7 'PhD/Doctorate'. 'Employed' is an indicator that is equal to one if the participant is part-time or full-time employed, and zero otherwise. 'Income' describes the monthly net household income over ten categories, where a higher category corresponds to higher income. 'Trust' describes participants trust in the federal government to manage the COVID-19 pandemic, on a scale from 1 'Strongly distrust' to 5 'Strongly trust.' 'Sharing in DG' gives the percentage of a 10 euros endowment that was passed to a charity of choice in a Dictator Game. 'Self-reported altruism' is measured on a scale from 0 to 10, with higher value denoting greater altruism. 'Lost job', 'Stay at home' and 'Avoid contact friends/family' are indicators for how participants' daily life is affected by the national lockdown. Column (1) and (2) give standard deviations and column (3) standard errors in parentheses. Significance levels: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

We structure our analysis in two steps. First, we compare the number of routines reported in each wave to determine whether the COVID-19 pandemic changed routines and induced the adoption of conservation actions. To adjust for potential imbalances across waves, we use participants' demographic and socio-economic characteristics as control variables. Second, we examine potential channels through which COVID-19 could have caused the formation of new routines. We do so by investigating how income shocks and behavioral changes associated with the lock-down affected the likelihood a respondent reported engaging regularly in each of the four distinct energy conservation actions. In this analysis, we again control for participants' characteristics along with measures of trust and altruism elicited in wave 2 of the survey. This allows us to control for the potential correlation between altruism/trust and adhering to the stay-at-home recommendations and a concurrent correlation between altruism/trust and the use of various energy conservation actions.

Table 1 reports the main summary statistics for the two waves of the survey. As noted in the table, both the overall number of routines reported and the likelihood of engaging in each conservation routine are higher in the second wave of the survey. For example, in the second wave of the survey, respondents were approximately 83 percent more likely to report that they adopted unplugging appliances as a routine and 13 percent more likely to report switching off lights when leaving a room as a routine. This provides initial evidence of the formation of new routines during the COVID-19 pandemic. However, as we observe significant differences in key demographics, such as income and the number of children

in the home across waves, we present below results from regression models that include controls for demographics and their effect on the use of the various conservation routines.

As noted in Table 1, about 13 percent of the sample report having lost their job due to the pandemic. This statistic coincides well with federal unemployment statistics, indicating that the pandemic strongly affected the job market during the months of April and May 2020 (Federal Employment Agency, 2020). We observe a greater fraction of individuals reporting a change in the time spent at home due to compliance with stay-at-home recommendations. For example, 71 percent report staying at home except to do basic shopping and 67 percent report avoiding face-to-face contact with friends and family. Both measures are highly correlated (Chi-square test, p=0.000, χ^2=141.3225, N=747), and about 54 percent of respondents report both staying-at-home and avoiding contact with others. We are able to observe variation in the two measures as the German federal government first eased the national lock-down mandates in May 2020, allowing for limited school time, shop and restaurant re-openings (Handelsblatt, 2021).

3. Individuals report more energy conservation routines during COVID-19

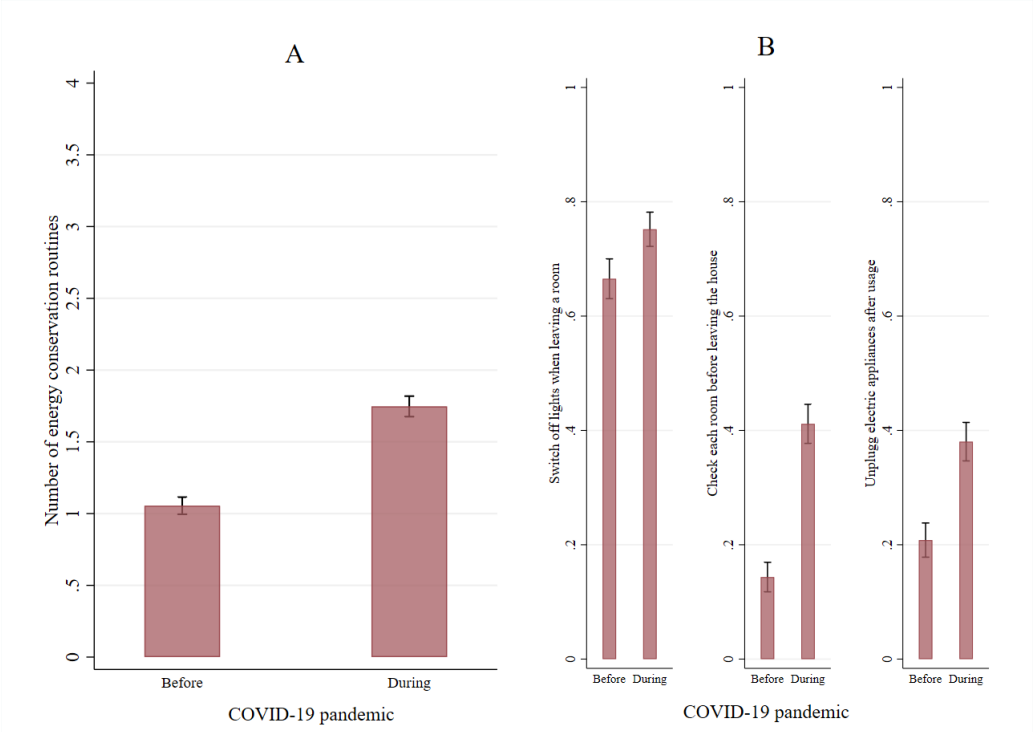

Figure 1: Total number of energy conservation routines (A) and likelihood to report individual actions as routine (B) before and during the COVID-19 pandemic. The vertical bars indicate 95-percent confidence intervals.

Figure 1 displays the results from a descriptive analysis comparing routines before and during the pandemic. As shown in panel A, the average number of reported routines for those surveyed during the COVID-19 pandemic is approximately 67 percent greater than those reported by counterparts surveyed before the pandemic (Fisher's exact test, p=0.000, N=1,471). We observe a similar pattern in panel B of Figure 1, which depicts the likelihood that respondents report each of the individual conservation actions as a routine. Compared to pre-COVID-19 levels, the probability that an individual reports adopting the routine of 1) switching off lights when leaving a room increases by 9 percentage points, 2) checking each room before leaving the house increases by 28 percentage points, and 3) unplugging appliances after usage increases by 18 percentage points. All three differences are statistically significant and provide evidence that individuals developed new routines during the COVID-19 pandemic (Chi-square

tests: p=0.000, χ^2=15.2954, N=1,471 for switching off lights, p=0.000, χ^2=134.7941, N=1,471 for checking each room, p=0.000, χ^2=54.2705, N=1,471 for unplugging appliances).

We next extend the analysis to control for demographic effects by estimating a series of linear regression models on the total number of reported routines (Table B1) and a series of linear probability models on the likelihood of reporting each of the given conservation actions as routine (Table B2). We first present results solely as a function of the wave and then extend the models to include controls for gender, age, number of children, educational degree, employment status and income. Estimates show that the number of routines and the likelihood of regularly executing any given conservation action are higher in the COVID-19 wave of the survey (p=0.000 for number of reported routines, Table B1, p=0.004 for switching off lights, p=0.000 for checking each room, p=0.000 for unplugging appliances, Table B2).

Before proceeding, we would like to address seasonal effects and differences in the timing of our survey waves as a potential concern with our approach and the interpretation of our findings. The first wave of our survey was conducted in the middle of winter, whereas the second was conducted in late spring. The need for and subsequent use of lights within the home is greater in winter months due to fewer hours of daylight. As such, there is greater opportunity to switch off lights when leaving a room and develop routines during the first wave of the survey – e.g., seasonal effects would make it harder to find more routines adopted in the second survey wave. This provides support for our interpretation that shocks related to COVID-19 induced the formation of new routines.

4. Exploring the drivers of adopting energy conservation routines

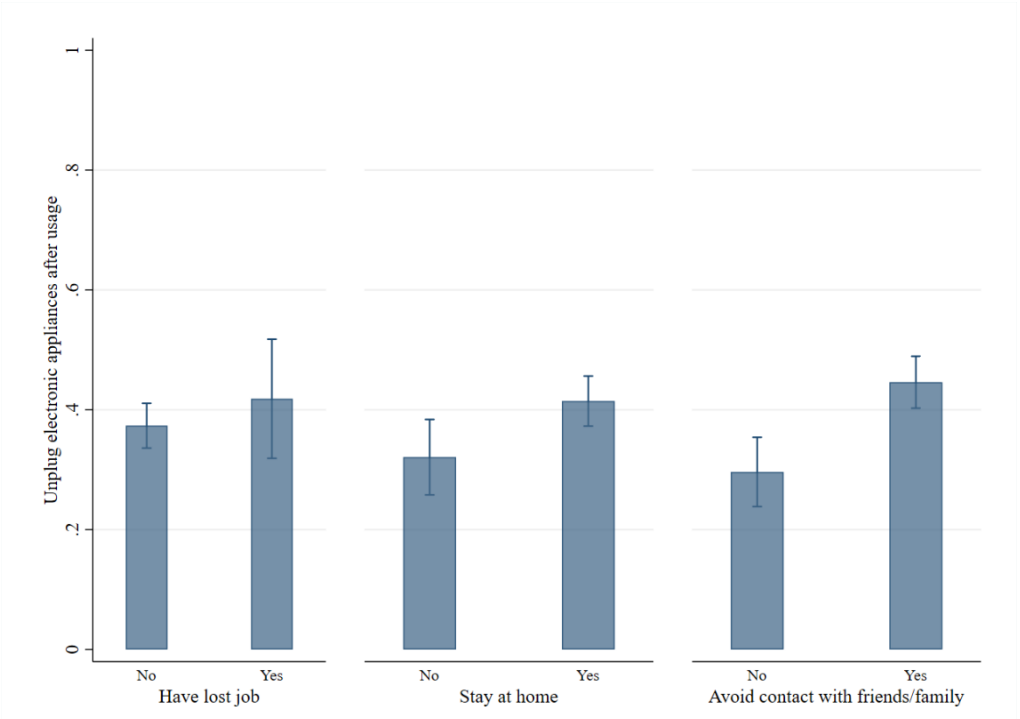

Figure 2: Reporting unplugging electronic appliances as routine by having lost the job, staying at home, and avoiding contact with friends/family during the COVID-19 pandemic. The vertical bars indicate 95-percent confidence intervals.

What drives the observed adoption of energy conservation routines? Figure 2 provides a descriptive view to disentangle two possible channels – reduced income or increased attention– that could underlie the formation of routines observed in the data. We measure shocks to (expected) income by employment loss, and shocks to attention devoted to electricity consumption by self-reported adherence with the stay-at-home mandates and reduced contact with friends and family. While an increased time spent at home

is only a proxy for attention towards electricity consumption, economic theories on rational inattention would predict a positive correlation between the measures; staying-at-home implies a reduction in the set of available options towards which attention can be directed (Gabaix, 2019).

As shown in Figure 2, the difference in the likelihood of regularly unplugging appliances after use is only significant for the subset of respondents who report spending more time at home due to following stay-at-home recommendations or having reduced contact with friends or family during the pandemic (Chi-square tests: p=0.017, χ^2=5.6648, N=753 for stay-at-home, p=0.000, χ^2=15.3843, N=752 for reducing contact with friends or family). Interestingly, there is no significant difference in the likelihood of unplugging appliances amongst those who lost their job due to the pandemic and those whose employment was unaffected by the pandemic (Chi-square test, p=0.393, χ^2 =0.7292, N=746). Viewed in conjunction, these differences suggest that it was increased attention, as proxied by increased time spent at home, rather than reduced income that underlies the adoption of energy conservation routines during the COVID-19 pandemic.

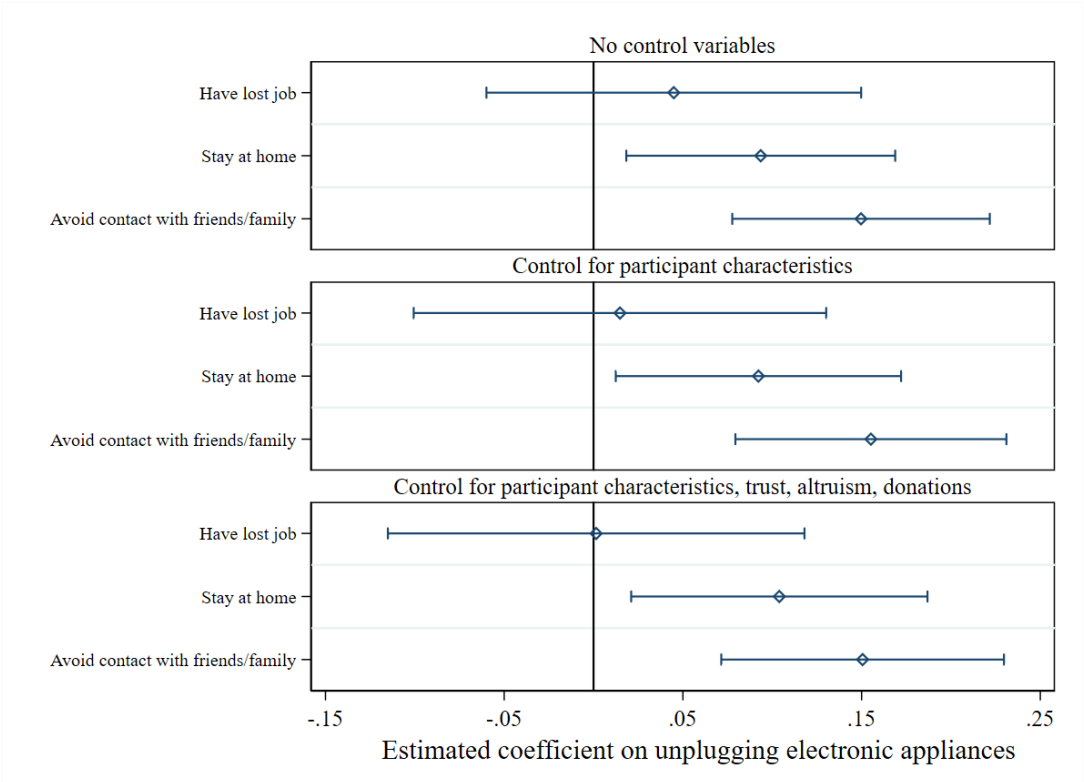

Figure 3: Estimated coefficients of having lost the job, staying at home, and avoiding contact with friends and family during the COVID-19 pandemic on reporting unplugging electronic appliances as routine. The horizontal bars indicate 95-percent confidence intervals.

To explore the robustness of these findings, we present results from a series of econometric models that include controls for gender, age, number of children, educational degree, employment status, income and individual specific proxies for trust, altruism, and donations - factors that could be correlated with both changes in employment and time spent at home during the pandemic and the likelihood of reporting conservation routines. The upper panel of Figure 3 displays the estimated coefficients and associated confidence intervals from an OLS regression (linear probability model) of reporting unplugging electronic appliances as a routine on our measures of COVID-induced changes in income and time spent at home. The middle panel displays these same coefficients from a model specification that includes participants' gender, age, number of children, education, employment status and income as control variables. The lower panel displays estimates for a model that adds additional controls for participants' trust in the federal government, sharing in the Dictator Game and a self-reported measure of altruism

(see Tables B3-B5). Across all specifications, having lost a job as a proxy for income shocks during the pandemic does not have a significant effect on the likelihood the respondent reports unplugging electronic appliances as a routine. In contrast, staying at home and avoiding face-to-face contact with friends and family lead to significant increases in the likelihood respondents report that they regularly unplug appliances after use.

As a final robustness check, we show that the main findings hold when investigating the relation between our proxies for lock-down-induced changes and three further outcomes of interest; the total number of reported routines and the likelihood of engaging in the other two energy-reducing actions (switching off lights when leaving a room and checking each room before leaving the house). Figure 4 displays the coefficients and associated confidence intervals from an OLS regression of these outcomes on the respective measures of lock-down-induced changes (see Tables B6-B7).

The two upper panels in Figure 4 display coefficient estimates and associated confidence intervals for the effect on specific conservation routines. Consistent with our prior results, we find that increased attention associated with the adherence to stay-at-home recommendations and reduced contact with others is a likely driver of the adoption of routines. For example, as displayed in the top panel, adhering to stay-at-home recommendations and reducing contact with friends and family are associated with significant increases in the likelihood of regularly switching off lights when leaving a room (p=0.062 for stay-at-home, p=0.052 for avoiding contact with friends/family, Table B6). We observe similar results in the middle panel of Figure 4. Staying-at-home is associated with an increase in the likelihood of reporting the routine of checking each room before leaving one's home but is not significant (p=0.245, Table B6). Reducing contact with friends and family, however, is associated with significant increases in reporting that routine (p=0.014, Table B6). In contrast, changes in employment and resulting income shocks have no significant positive impact, or even a negative impact, on the adoption of energy saving routines during the pandemic (p=0.044 for switch off lights, p=0.681 for checking each room, Table B6).

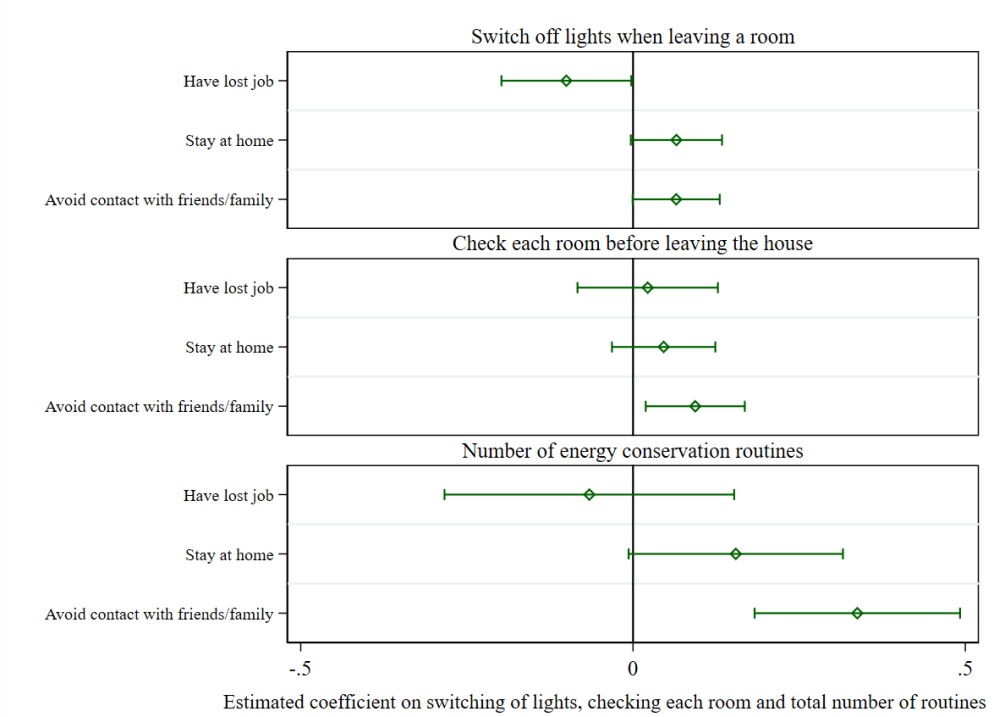

Figure 4: Estimated coefficients of having lost the job, staying at home, and avoiding contact with friends and family during the COVID-19 pandemic on reporting switching of lights, checking each room and the total number of reported routines. The horizontal bars indicate 95-percent confidence intervals.

The bottom panel of Figure 4 displays the effects from regressions exploring the total number of routines reported. As shown in the figure, the factors determining the total number of reported routines mirror those underlying changes in each of the individual energy saving actions. Having lost a job and employment income during the pandemic does not significantly affect the total number of reported routines (p=0.554, Table B7). In contrast, staying at home and avoiding contact with friends and family during the pandemic are both associated with an increase the overall number of reported routines (p=0.060 for stay-at-home, p=0.000 for avoiding contact, Table B7). Viewed in their totality, these data provide additional support for our conjecture that an increased attention devoted to energy consumption, proxied by increased time spent at home, explains the formation of sustainable routines during the COVID-19 pandemic.

5. Pro-environmental concern as driver of the formation of energy conservation routines and a "finite pool of worry"

A concern with the interpretation of our findings is that the observed increase in routines might reflect a general increase in pro-sociality or pro-environmentalism during the pandemic, as opposed to increased attention. While such an increase would be inconsistent with the theory on a "finite pool of worry" (Weber, 2006, 2015), we address this concern by utilizing survey questions from the German Socio-Economic Panel (SOEP) to explore changes in pro-social behavior and environmental attitudes during our study periods.

Since 1984, the SOEP surveys each year a representative sample of the German population.[2] To mirror the time dimensions of our survey, we use the individual and household questionnaires of the SOEP-Core (v37, 10.5684/soep.core.v37eu) and restrict the data to the 2017, 2018 and 2020 survey waves. This leaves us with 32,485, 30,306 and 30,470 individual observations for the respective years.

The three survey waves include a question on attitudes towards different societal challenges, including the impact of climate change and environmental protection. Specifically, individuals are asked "How concerned are you about the following issues?", "The impacts of climate change", "Environmental protection." Answers that are given on a three-point scale from 1 "Not concerned at all", 2 "Somewhat concerned", to 3 "Very concerned." Further, the 2018 and 2020 survey waves include two questions that proxy general pro-sociality. First, both waves ask for money donations in the past year. Recorded are both a binary donation-indicator and the estimated donation amount in Euros.[3] Second, respondents were also asked whether they have donated money or goods to refugees in the past or plan to do so in the future.[4]

To assess changes over time in pro-sociality, we compare responses in the 2020 survey to responses in the 2018 wave. Results are displayed in Figure 5 and show significant decreases in the likelihood of donating money in general, of having donated to refugees in the past and of planning to donate to refugees in the future (Chi-square tests, p=0.000, χ^2=38.7240, N=51,708 for donating money, p=0.000, χ^2=161.3436, N=51,443 for donating to refugees in the past, p=0.000, χ^2=542.1582, N=50,689 for donating to refugees in the future). In contrast, the monetary amount donated seems to have increased

[2] Individuals are selected using random-walk routines. (Kara & Zimmermann, 2022) give more details on the SOEP survey methodology.

[3] The exact question wording is "Now we have a question about donations. We understand donations to mean money given for social, religious, cultural, non-profit, and charitable purposes without the expectation of receiving anything directly in return. It can consist of larger sums or smaller sums like those saved in a piggy bank. We also consider offerings collected at church as donations. Did you donate money last year, that is, in 2019, not including membership fees?" and, if this question was answered with "Yes", "How much money did you donate in total in the last year? If you are not sure of the exact amount, please estimate!"

[4] The question reads "Which of the following activities relating to refugee issues have you engaged in since last year, and which do you plan to (also) engage in in the future?", "Donating money or goods to help refugees". Answers are recorded as "Yes" or "No" to "Have you done that since last year?" and "Do you plan to (also) do that in the future?"

during the pandemic (two-sample t test, p=0.000, t=7.0352, N=51,127). Since the SOEP data involves a panel dimension, we next analyze within-subject changes over time to net out potential sample differences. To further correct for potential within-subject changes in income from 2018 to 2020 that may correlate with pro-sociality and the pandemic, we also control for household income. Table B8 reports the corresponding regression results. Accordingly, the increase in donation amount becomes insignificant, while the decreases in the likelihood to donate, in the likelihood to donate to refugees in the past and future remain significant (p=0.000 for likelihood to donate, p=0.767 for amount donated, p=0.000 for donated to refugees in the past, p=0.000 for donate to refugees in the future, Table B8).

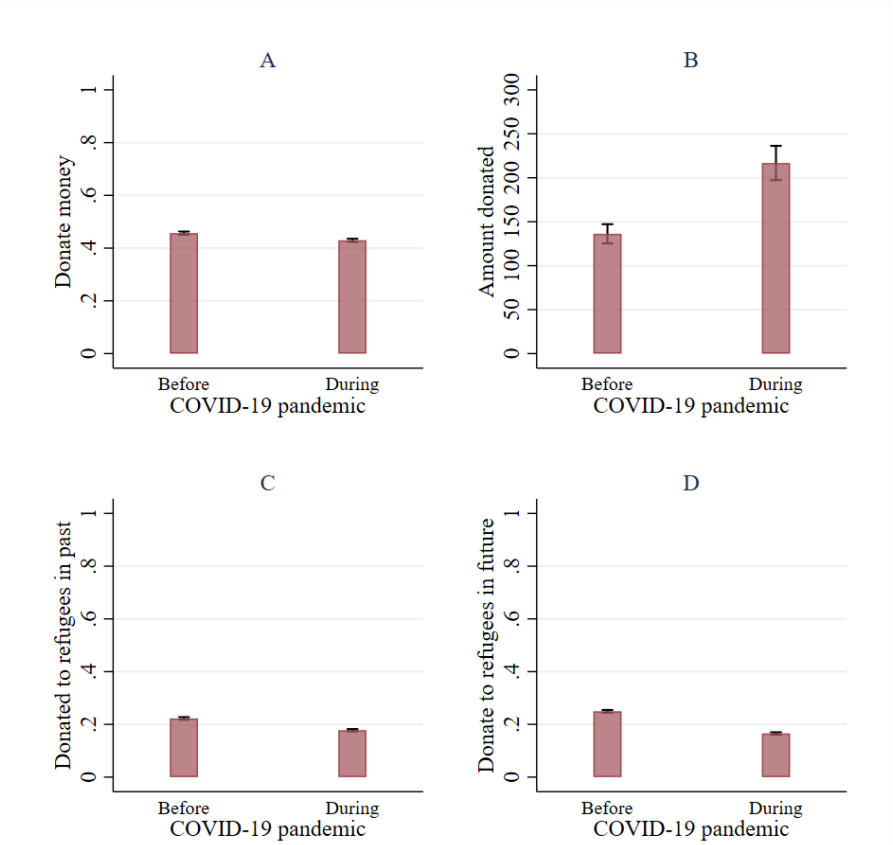

Figure 5: The likelihood of donating money (A), the monetary amount donated (B), the likelihood of having donated to refugees in the past (C) and the likelihood of planning to donate to refugees in the future (D) before and during the COVID-19 pandemic. The horizontal bars indicate 95-percent confidence intervals.

We follow a similar strategy to assess changes in pro-environmental concerns and compare responses in the 2020 survey wave to responses in the pooled 2017 and 2018 waves. Accordingly, both the concern about the impact of climate change and the concern about environmental protection have increased from the 2017/2018 surveys to the survey wave conducted during the pandemic (Chi-square tests, p=0.000, χ^2=222.6585, N=78,545 for climate change impacts, p=0.000, χ^2=97.0536, N=78,604 for environmental protection). However, given the course of the pandemic, there may be large heterogeneities within the 2020 wave of the SOEP survey. Figure 6 plots the COVID-19 incidence, i.e. the cases of the last seven days per 100,000 inhabitants, as provided by (Federal Statistical Office of Germany, 2022b) and the concerns about climate change impacts by date. To do so, we use the average concern reported by individuals that were surveyed on the respective date. Figure C1 does the same for concerns about environmental protection. Further, Table B9 provides the econometric results of the association between daily COVID-19 incidence and concerns about the environment. Both Figure 6 and Table B9 show evidence of a significant and negative association between COVID-19 cases and environmental

concerns (p=0.022 for concern about climate change impacts, p=0.022 for concern about environmental protection, Table B9). Thus, while there is an upward trend in environmental concerns over time, this pattern is reversed during the pandemic.[5] Further, we do not find any evidence of increased general pro-sociality during the pandemic.

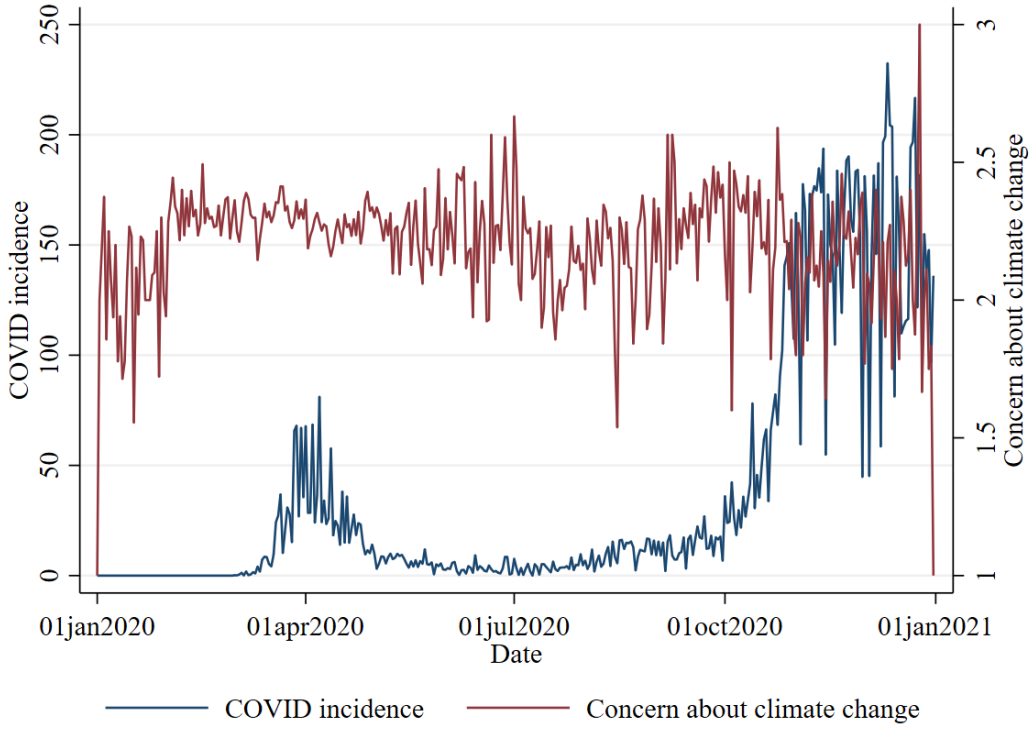

Figure 6: COVID-19 incidence (blue, left axis) and concern about climate change impacts (red, right axis) by date. Incidence is measured as confirmed cases in the last seven days per 100,000 inhabitants. We plot the average concern of individuals surveyed the respective date.

Hence, our results are consistent with a "finite pool of worry" among survey respondents whose concern about the pandemic crowds out environmental concerns and consistent with evidence reported by (Smirnov & Hsieh, 2022) or (Loureiro & Alló, 2021) using Twitter data. Considering the reduction in environmental concerns while the stay-at-home orders were in effect, we might even observe a lower bound of the impact of increased attention on the formation of energy conservation routines. If the stay-at-home orders and associated worries did not crowd out environmental concerns, individuals could have been more willing to act driven by the increased attention towards saving energy.

6. Discussion and conclusion

We use novel survey data to explore the effect of COVID-19 on the formation of energy saving routines. The surveyed German households are more likely to report adopting energy conserving routines during the COVID-19 pandemic than before it began. We then provide evidence that behavioral motives like shifts in attention, proxied by individuals spending more time at home, as opposed to changes in (expected) income or pro-environmental concerns, are the likely drivers of the observed increase in energy conservation routines during the pandemic. One potential explanation for the lack of income effects is the energy billing structure in Germany and other countries around the world. As most households receive annual energy bills (Werthschulte & Löschel, 2021), the savings associated with reductions in consumption may not materialize for several months and certainly not at the time when

[5] Figure C2 displays time trends in the concern about climate change impacts and environmental protection from 2010 to 2020. Both concerns experience a sharp drop in 2020.

the conservation actions are taken. This likely reduces the responsiveness to the financial incentives to conserve energy following negative income shocks.

If the observed changes in routine persist, what do our results imply for aggregate patterns of electricity consumption and the potential for household conservation actions to affect global carbon emissions? A back-of-the-envelope calibration shows that these small changes in routines can lead to substantial energy savings. According to our estimates, unplugging appliances after usage could lead to savings of up to 210 kilowatt hours per year for a two-person German household (co2online, 2018). In the most robust specification (see Table B2), our results suggest an approximate 13 percentage points increase in the likelihood an individual regularly unplugs appliances after use. Extrapolating this effect to the 41.5 million households in Germany,[6] our estimates imply energy savings of around 1.13 terawatt hours per year. To put it into perspective, this corresponds to approximately 0.2 percent of the overall energy consumption in Germany (BDEW, 2020) and financial savings of around 361 million euros per year (co2online, 2021). In terms of environmental benefits, the estimated increased likelihood to unplug electronic appliances corresponds to 0.5 Mtons of avoided carbon and 253 tons of avoided Sulfur dioxide emissions (German Environment Agency, 2020). If we take a more conservative approach and restrict the analysis to changes directly related to the stay-at-home recommendations (see Table B4), the 9-percentage points increase in the likelihood of reporting unplugging appliances as a routine among those staying at home corresponds to approximate savings of 19-kilowatt hours per year. Scaling the 71 percent of our representative sample who reported staying at home during the pandemic to the entirety of the German population, our estimates imply average national savings of approximately 0.56 terawatt hours per year.

In conclusion, the results from our survey provide evidence of an unintended benefit of national lock-down policies – the adoption of energy conservation routines by households. In doing so, we highlight a plausible channel through which the COVID-19 pandemic may have expedited a long-run change towards sustainable consumption and associated reductions in emissions from residential energy consumption. These findings are promising. However, it is important to remember that our second wave of data was collected at the beginning of the pandemic during Germany's first lockdown mandate.

Future work should investigate whether or not the observed adoption of energy conservation routines persist in the longer run (Allcott & Rogers, 2014; Ferraro & Price, 2013; Ito et al., 2018), or if the new routines lead to rebound effects (Freire-González & Font Vivanco, 2020) that attenuate the resulting savings. Similarly, it remains to investigate whether the COVID-19 pandemic affected beliefs about energy consumption and the benefits of various strategies to curtail energy use. As discussed in (Attari, 2018), misperceptions about the relative effectiveness of various strategies to adjust consumption could fundamentally limit the effectiveness of programs to reduce use. Unfortunately, our study does not allow us to discern whether the adoption of routines reflects a heuristic or a change in beliefs about the relative benefits of various conservation strategies.

A related direction for future work is to explore whether routines formed during the COVID-19 pandemic impact the acceptance and effectiveness of other climate change mitigation strategies, such as those focusing on behavioral interventions (Allcott, 2011a; Ayres et al., 2013; Bergquist & Nilsson, 2016; Bonan et al., 2020; Brandon et al., 2019; Byrne et al., 2018; Jachimowicz et al., 2018; Löschel et al., 2020; Tiefenbeck et al., 2018, 2019) or pecuniary incentives (Allcott, 2011b; A. Faruqui et al., 2010; Ahmad Faruqui & Sergici, 2010; Harding & Lamarche, 2016; Ivanov et al., 2013; Jessoe & Rapson, 2014; White & Sintov, 2018; Wolak, 2011). To date, this work has explored whether the acceptance and effectiveness of these programs depend on factors such as one's beliefs about relative energy consumption (Byrne et al., 2018), one's beliefs about how others perceive the benefits of conservation (Jachimowicz et al., 2018), one's beliefs about perceived savings (White & Sintov, 2018), or high frequency feedback on underlying prices and quantity consumed (Allcott, 2011b; Harding & Lamarche,

[6] The average German household size is a two-person household (Federal Agency for Civic Education, 2021).

2016; Ivanov et al., 2013; Jessoe & Rapson, 2014). It is, thus, natural to extend this line of inquiry and ask the following question: are behavioral routines complements to or substitutes for policies to curtail energy use and mitigate climate change?

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Appendix

A Recruitment, sampling frame and survey questions

We subcontracted the GMS Dr. Jung GmbH for data collection. The GMS Dr. Jung GmbH is member of the ESOMAR network, and as such assured to high quality and ethical research practices (https://www.esomar.org/web/mmark_corporate/validation.php?id=420). An IRB approval was not required, but data collection was both in line with the ESOMAR standards and the European data protection regulation as approved by the University of Münster. For survey wave 1, the GMS Dr. Jung GmbH subcontracted the ARIS Umfrageforschung GmbH to conduct computer-assisted face-to-face interviews (CAPI). The ARIS Umfrageforschung GmbH is member of the German Association for Market Research (ADM), and hence bounded to both the ESOMAR guidelines and additional quality standards (https://www.adm-ev.de/standards-richtlinien/). Interviewers asked the survey questions and recorded participant responses on the laptop. Survey wave 2 was operationalized using an online survey. Participants were recruited based on an online panel of a cooperation partner of the GMS Dr. Jung GmbH. The GMS Dr. Jung GmbH used the software ingress for programming and executing the surveys (https://www.ingress-survey.co.uk/Software/Survey-software-keyingress/). In wave 1, fieldwork started on 11 December 2017, paused from 22 December to 2 January 2018, and was finished on 22 January 2018. In wave 2, the online survey started on 18 May 2020 and finished on 25 May 2020.

One difference between the two waves is, thus, the operationalization of data collection. The reason for this difference in administering the surveys is the COVID-19 pandemic and the restrictions on face-to-face contact. Importantly, such restriction prohibited us from sending interviewers from door-to-door during the second wave of data collection. As we outsourced data collection for both waves of the survey to the same market research institute, we were able to hold constant all other operative processes that could affect the composition of our sample and ensure that data collection was as comparable as possible across waves. While we acknowledge that this change could lead to selection effects, there is little difference in observable demographics across waves. This is consistent with mostly all social interactions taking place online during the national lock-downs (e.g., work meetings, events, and meetings with friends), which likely decreased the selection effects of online interactions.

Recruitment for both survey waves was quota-based. For wave 1, quotas were determined on federal state level (NUTS 1) and by city inhabitants. Given the federal state and inhabitant quotas, a combined quotation of age and gender was created. Age was restricted to be older than 16 years. The ARIS Umfrageforschung GmbH was responsible for quotation, selecting participants, training interviewers and conducting the interviews. The processing was as follows: 1. The interviewers received information on the study and were asked to list persons interested to participate with their name, address and telephone number on a prepared quotation sheet. 2. Based on the quotations sheets, the ARIS Umfrageforschung GmbH selected participants (number of required interviews plus 10-15 percent) fulfilling the quotas. Selected participants were reported to the interviewer. 3. The interviewer contacted selected participants and made an appointment for the interview. 4. During data collection, the interviewers were obliged to report the conducted interviews with corresponding quotas to the ARIS Umfrageforschung GmbH. The ARIS Umfrageforschung GmbH continuously controlled the survey and fulfillment of quotas. 5. Further, 25 percent of the interviews were subject to quality control. As such, the ARIS Umfrageforschung GmbH contacted participants, and ensured that interviews were conducted correctly. In total, 1257 participants were recruited. Of these recruited participants, 2.1 percent were not at home on the agreed date. Another 10.7 percent refused to participate at the agreed date of the interview, 28.2 percent refused to continue participation during the interview, and 2.5 percent produced unusable interviews (questions mostly not answered). This gives our final sample size of 711 completed interviews.

Recruitment of wave 2 was organized such that participants who registered in the Online Access Panel of the cooperation partner were contacted by e-mail and asked to participate in the survey. The e-mail

contained a unique link to the questionnaire. Participation was restricted as to fulfill pre-defined quotas representing the German population. Quotas were determined on federal state level (NUTS 1) and a combined quotation of age (18 and older) and gender. The cooperation partner monitored in real-time survey access and quota fulfillment. A total of 802 participants were recruited. We observe response times lower than 40 percent of the modal response time for 24 participants, 8 participants might have participated twice, and 14 responses mostly indicated "no answer." We did not exclude any responses.

For both waves, sample sizes were determined based on the trade-off between the costs of interviewing a given number of subjects and having sufficient observations in each of the quotation groups (e.g., in each age-gender combination cell). Our final sample sizes of 711 for wave 1 and 802 for wave 2 are able to detect significant differences at the conventional 1-percent and 5-percent level with sufficient power (β=1 for the no. of routines, β=0.9761 for switch off lights, β=1 for check each room and β=1 for unplugging appliances) in the before/during COVID-19 comparison.

When asking about energy conservation routines, participants had to select all routines displayed in check boxes that apply to them. The exact wording of this question when translated into English was "Do you follow any routines with regards to energy saving actions? Please check all that apply." The check boxes were: 'I don't follow any routines,' 'I check each room every time before leaving the house,' 'I turn off the light when leaving the room,' 'I unplug electronic devices after usage,' and 'Other routines.' We coded responses by both assigning an indicator to each checked box and by summing the total number of selected routines.

We elicited the following demographic and socio-economic characteristics: gender, number of children, participants' employment status before the pandemic (coded to be an indicator for whether the participant was full-time or part-time employed) and categories on participants' highest educational degree. The education categories are: 1 'Below primary education,' 2 'Primary education,' 3 '9-year degree (Hauptschulabschluss),' 4 '10-year degree (Mittlere Reife),' 5 'University qualification (Abitur),' 6 'Bachelor or master,' 7 'PhD/Doctorate.' Finally, we asked for last year's monthly net household income, by giving participants ten income brackets. These brackets are 1 '855 euros or below.' 2 '856 – 1.113 euros,' 3 '1.114 – 1.326 euros,' 4 '1.327 – 1.518 euros,' 5 '1.519 – 1.722 euros,' 6 '1.723 – 1.945 euros,' 7 '1.946 – 2.221 euros,' 8 '2.222 – 2.585 euros,' 9 '2.586 - 3.200 euros,' and 10 'More than 3.200 euros.'

To elicit trust, we asked "To what extent do you trust the Federal Government in dealing with the Corona virus?" Answers were recorded on a five-point scale from "Strongly distrust" to "Strongly trust." To elicit individual self-reported altruism, we asked "On a scale of 0 ('not willing at all') to 10 ('Very willing'), how willing would you be to give to good causes without expecting anything in return?"

As a second measure for altruism, we utilized a modified Dictator Game. In the first stage of the game, participants were asked to select one potential recipient out of three charitable causes – Doctors Without Borders, Feed the Children, and Amnesty International. In the second stage of the modified Dictator Game, participants were asked to split an endowment of 10 euros between themselves and the charity selected in the first stage. We incentivized decisions such that each participant had a 25 percent chance that the Dictator Game was actually paid out and impacted their total earnings from completing the survey.

In both waves, participants knew that the survey was designed by researchers. The research question however was blind to participants. Data analysis was conducted using STATA 16.1 (64-bit). The raw data for wave 1 is publicly available at: http://www.enable-eu.com/downloads-and-deliverables/ (Dataset for the comparative sociological analysis of the household survey results, country: Germany). The complete merged data set for wave 1 and wave 2 analyzed in the current study are available on request from the corresponding author.

B Tables

Table B1: OLS regression of number of energy conservation routines on survey wave and control variables

	(1) No. routines	(2) No. routines
During COVID-19	0.692***	0.556***
	(0.0474)	(0.0615)
Female		0.109**
		(0.0556)
Age		-0.0000355
		(0.00174)
No. children		0.0475
		(0.0303)
Education		0.0653**
		(0.0255)
Employed		0.0751
		(0.0617)
Income		-0.0102
		(0.0104)
Observations	1471	1180
Adjusted R^2	0.123	0.100

Note: 'No. routines' denotes the number of reported energy conservation routines, ranging from zero to four. 'During COVID-19' is an indicator on whether the observation was collected during COVID-19 in wave 2, or before COVID-19 in wave 1. The number of children is top-coded at '5 or more.' Education is a categorical variable from 1 'No education' to 7 'PhD/Doctorate.' 'Employed' is an indicator that is equal to one if the participant is part-time or full-time employed, and zero otherwise. 'Income' describes the monthly net household income in ten categories, where a higher category corresponds to higher income. Standard errors in parentheses. Significance levels: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table B2: OLS regressions of individual energy saving actions reported as routine on survey wave and control variables

	(1) Switch off lights	(2) Switch off lights	(3) Check each room	(4) Check each room	(5) Unplug appliances	(6) Unplug appliances
During COVID-19	0.0905***	0.0827***	0.276***	0.211***	0.178***	0.129***
	(0.0232)	(0.0290)	(0.0223)	(0.0295)	(0.0234)	(0.0305)
Female		0.0393		0.0405		0.0693**
		(0.0254)		(0.0265)		(0.0273)
Age		-0.000218		-0.0000467		0.0000323
		(0.000814)		(0.000781)		(0.000868)
No. children		0.00477		0.0300**		0.00868
		(0.0124)		(0.0141)		(0.0140)
Education		0.0127		0.0113		0.0219*
		(0.0116)		(0.0124)		(0.0124)
Employed		-0.0200		0.0669**		0.0409
		(0.0287)		(0.0287)		(0.0309)
Income		0.00744		-0.0142***		-0.00623
		(0.00470)		(0.00484)		(0.00503)
Observations	1471	1180	1471	1180	1471	1180
Adjusted R^2	0.010	0.011	0.091	0.071	0.036	0.027

Note: 'Switch off lights,' 'Check each room' and 'Unplug appliances' are indicators that are equal to one if the participant reported the respective action as routine and zero otherwise. 'During COVID-19' is an indicator on whether the observation was collected during COVID-19 in wave 2, or before COVID-19 in wave 1. The number of children is top-coded at '5 or more.' Education is a categorical variable from 1 'No education' to 7 'PhD/Doctorate.' 'Employed' is an indicator that is equal to one if the participant is part-time or full-time employed and zero otherwise. 'Income' describes the monthly net household income in ten categories, where a higher category corresponds to higher income. Standard errors in parentheses. Significance levels: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table B3: OLS regressions of unplugging electronic appliances after usage on having lost the job due to the COVID-19 pandemic and control variables

	(1) Unplug appliances	(2) Unplug appliances	(3) Unplug appliances
Have lost job	0.0449	0.0148	0.00148
	(0.0534)	(0.0588)	(0.0594)
Female		0.136***	0.136***
		(0.0376)	(0.0382)
Age		0.000353	0.000584
		(0.00136)	(0.00139)
No. children		-0.00919	-0.00644
		(0.0166)	(0.0169)
Education		0.0301	0.0242
		(0.0186)	(0.0191)
Employed		0.0463	0.0419
		(0.0423)	(0.0429)
Income		-0.00345	-0.00659
		(0.00659)	(0.00676)
Trust			0.00542
			(0.0156)
Sharing in DG			-0.0670
			(0.0661)
Self-reported altruism			0.0192***
			(0.00679)
Observations	746	683	665
Adjusted R^2	-0.000	0.014	0.022

Note: 'Unplug appliances' is an indicator that is equal to one if the participant reported the corresponding action as a routine, and zero otherwise. 'Lost job' is an indicator that equals one if the participant was laid off or his/her business had to shut down due to the pandemic. The number of children is top-coded at '5 or more.' Education is a categorical variable from 1 'No education' to 7 'PhD/Doctorate.' 'Employed' is an indicator that is equal to one if the participant is part-time or full-time employed and zero otherwise. 'Income' describes the monthly net household income in ten categories, where a higher category corresponds to higher income. 'Trust' describes participants trust in the federal government to manage the COVID-19 pandemic, on a scale from 1 'Strongly distrust' to 5 'Strongly trust.' 'Sharing in DG' reports the percentage of a 10 euros endowment that was passed to a charity of choice in a modified Dictator Game. 'Self-reported altruism' is measured on scale from 0 to 10, with higher values denoting greater altruism. Standard errors in parentheses. Significance levels: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table B4: OLS regressions of unplugging electronic appliances after usage on staying at home due to the COVID-19 pandemic and control variables

	(1) Unplug appliances	(2) Unplug appliances	(3) Unplug appliances
Stay at home	0.0936**	0.0923**	0.104**
	(0.0383)	(0.0407)	(0.0422)
Female		0.133***	0.129***
		(0.0373)	(0.0379)
Age		0.000672	0.00113
		(0.00135)	(0.00139)
No. children		-0.00663	-0.00513
		(0.0163)	(0.0164)
Education		0.0260	0.0214
		(0.0184)	(0.0189)
Employed		0.0295	0.0266
		(0.0420)	(0.0427)
Income		-0.00201	-0.00534
		(0.00645)	(0.00662)
Trust			-0.00133
			(0.0156)
Sharing in DG			-0.0712
			(0.0652)
Self-reported altruism			0.0185***
			(0.00681)
Observations	753	693	676
Adjusted R^2	0.006	0.019	0.026

Note: 'Unplug appliances' is an indicator that is equal to one if the participant reported the corresponding action as a routine and zero otherwise. 'Stay at home' is an indicator that equals one if the participant stays at home due to the pandemic. The number of children is top-coded at '5 or more.' Education is a categorical variable from 1 'No education' to 7 'PhD/Doctorate.' 'Employed' is an indicator that is equal to one if the participant is part-time +or full-time employed and zero otherwise. 'Income' describes the monthly net household income in ten categories, where a higher category corresponds to higher income. 'Trust' describes participants trust in the federal government to manage the COVID-19 pandemic, on a scale from 1 'Strongly distrust' to 5 'Strongly trust.' 'Sharing in DG' reports the percentage of a 10 euros endowment that was passed to a charity of choice in a Dictator Game. 'Self-reported altruism' is measured on scale from 0 to 10, with higher values denoting greater altruism. Standard errors in parentheses. Significance levels: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table B5: OLS regressions of unplugging electronic appliances after usage on avoiding contact with friends/family due to the COVID-19 pandemic and control variables

	(1) Unplug appliances	(2) Unplug appliances	(3) Unplug appliances
Avoid contact with friends/family	0.150***	0.155***	0.151***
	(0.0367)	(0.0386)	(0.0403)
Female		0.126***	0.125***
		(0.0372)	(0.0376)
Age		0.000523	0.000987
		(0.00134)	(0.00136)
No. children		-0.0124	-0.0113
		(0.0164)	(0.0164)
Education		0.0247	0.0179
		(0.0184)	(0.0187)
Employed		0.0221	0.0188
		(0.0412)	(0.0416)
Income		-0.00194	-0.00538
		(0.00639)	(0.00654)
Trust			-0.00230
			(0.0155)
Sharing in DG			-0.0767
			(0.0640)
Self-reported altruism			0.0195***
			(0.00667)
Observations	752	694	681
Adjusted R^2	0.019	0.033	0.043

Note: 'Unplug appliances' is an indicator that is equal to one if the participant reported the corresponding action as a routine and zero otherwise. 'Avoid contact with friends/family' is an indicator that equals one if the participant avoids face-to-face contact with friends and family due to the pandemic. The number of children is top-coded at '5 or more.' Education is a categorical variable from 1 'No education' to 7 'PhD/Doctorate' 'Employed' is an indicator that is equal to one if the participant is part-time or full-time employed, and zero otherwise. 'Income' describes the monthly net household income in ten categories, where a higher category corresponds to higher income. 'Trust' describes participants trust in the federal government to manage the COVID-19 pandemic, on a scale from 1 'Strongly distrust' to 5 'Strongly trust.' 'Sharing in DG' reports the percentage of a 10 euros endowment that was passed to a charity of choice in a Dictator Game. 'Self-reported altruism' is measured on scale from 0 to 10, with higher values denoting greater altruism. Standard errors in parentheses. Significance levels: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table B6: OLS regressions of individual energy saving actions reported as routine on measures of changed income and time spent at home due to the COVID-19 pandemic

	(1) Switch off lights	(2) Switch off lights	(3) Switch off lights	(4) Check each room	(5) Check each room	(6) Check each room
Have lost job	-0.100**			0.0221		
	(0.0497)			(0.0538)		
Stay at home		0.0653*			0.0461	
		(0.0350)			(0.0396)	
Avoid contact with friends			0.0649*			0.0937**
			(0.0334)			(0.0380)
Observations	746	753	752	746	753	752
Adjusted R^2	0.005	0.004	0.004	-0.001	0.000	0.007

Note: 'Switch off lights' and 'Check each room' are indicators that are equal to one if the participant reported the respective action as a routine, and zero otherwise. 'Lost job', 'Stay at home' and 'Avoid contact friends' are indicators for how participants' daily lives were affected by the COVID-19 pandemic. Standard errors in parentheses. Significance levels: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table B7: OLS regressions of number of energy conservation routines on measures of changed income and time spent at home due to the COVID-19 pandemic

	(1) No. routines	(2) No. routines	(3) No. routines
Have lost job	-0.0657		
	(0.108)		
Stay at home		0.155*	
		(0.0819)	
Avoid contact with friends			0.338***
			(0.0777)
Observations	746	753	752
Adjusted R^2	-0.001	0.003	0.023

Note: 'No. routines' denotes the number of reported energy conservation routines, ranging from zero to four. 'Lost job,' 'Stay at home' and 'Avoid contact friends' are indictors for how participants' daily lives were affected by the COVID-19 pandemic. Standard errors in parentheses. Significance levels: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table B8: OLS regressions of concern about the impacts of climate change and environmental protection on survey wave

	(1) Donated money	(2) Donation amount	(3) Donated to refugees in the past	(4) Donate to refugees in the future
During COVID-19	-0.0370***	2.020	-0.0986***	-0.0575***
	(0.00347)	(6.809)	(0.00335)	(0.00303)
Income	0.00000398*	0.000560	0.000000809	0.00000186
	(0.00000217)	(0.00851)	(0.00000223)	(0.00000215)
Subject FE	yes	yes	yes	yes
Observations	51574	50996	50567	51313
Adjusted R^2	0.006	-0.000	0.018	0.044

Note: 'Donated money' is an indicator that equal to one if the participant donated money for good causes in the past year. 'Donation amount' gives the euro amount donated to good causes in the past year. The donation amount equals zero if no donations were made. 'Donated to refugees in the past' and 'Donate to refugees in the future' are indicators that equal to one if the participant donated money or goods to refugees in the past or plans to do so in the future, respectively. 'During COVID-19' is an indicator on whether the observation was collected during COVID-19 in the 2020 wave, or before COVID-19 in the 2018 wave. 'Income' describes the monthly net household income, a higher value indicates higher income. All regressions include subject fixed effects. Standard errors are clustered on the subject level and reported in parentheses. Significance levels: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table B9: OLS regressions of concern about the impacts of climate change and environmental protection on COVID-19 incidence

	(1) Average concern about climate change	(2) Average concern about environmental protection
COVID-19 incidence	-0.000520**	-0.000498**
	(0.000225)	(0.000216)
State FE	yes	yes
Observations	366	366
Adjusted R^2	0.043	0.036

Note: 'Average concern about climate change' and 'Average concern about environmental protection' are the daily average of the responses to the concern about climate change impacts and environmental protection, respectively, from 1 (no concern) to 3 (great concern). COVID-19 incidence is the daily number of cases of the last seven days per 100,000 inhabitants as reported by the German Federal Statistical Offices. All regressions include state fixed effects. Robust standard errors are reported in parentheses. Significance levels: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

C Figures

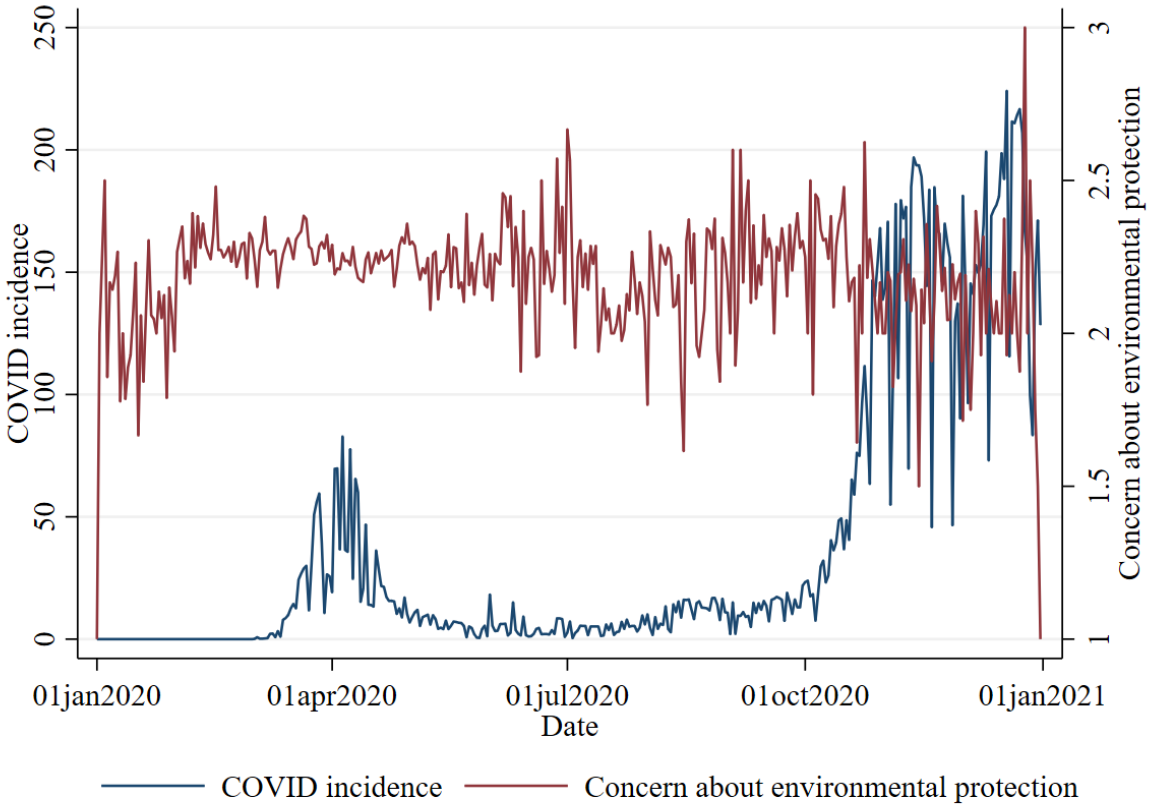

Figure C1: COVID-19 incidence (blue, left axis) and concern about environmental protection (red, right axis) by date. Incidence is measured as confirmed cases in the last seven days per 100,000 inhabitants. We plot the average concern of individuals surveyed the respective date.

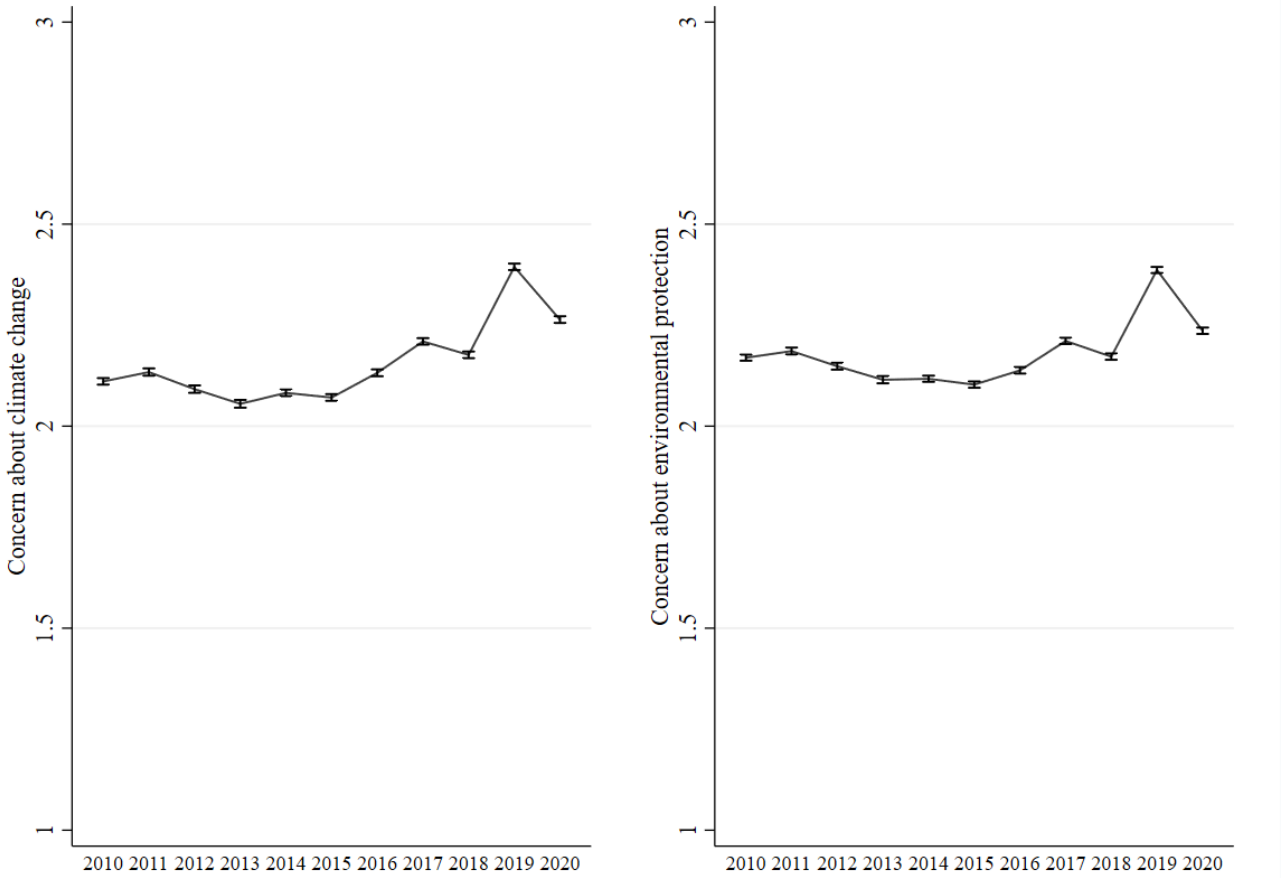

Figure C2: Concern about climate change impacts (left panel) and concern about environmental protection (right panel) by survey year. The vertical bars indicate 95-percent confidence intervals.

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