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How to Enhance Time Wealth? Insights from Changes in Time Use and Working Conditions During the COVID-19 Lockdown in Germany

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Abstract

This paper investigates the changes in time use, working conditions and subjective time wealth during the COVID-19 pandemic in Germany. Our analysis draws on panel data collected before and during the first lockdown among 786 employees. It employs a recently developed scale on time wealth which has been suggested as a comprehensive measure to capture the subjective experience of time. We provide separate analyses according to gender and essential occupation. First-difference regressions are applied to examine how changes in time use and changes in working conditions during the lockdown affected subjective time wealth. Our results show a general growth in time wealth during the lockdown which is, among other factors, driven by a decline in work hours and an increase in sleep duration. We also find positive effects on time wealth from decreased time pressure at work, more autonomy in organising one's working day, and an improved reconciliation of work and private life. This study contributes to existing research by identifying key aspects how to improve time wealth among employees.

Keywords COVID-19 · Time wealth · Time use · Working conditions · Essential workers · First-difference regression

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1 Introduction

The COVID-19 pandemic has changed every-day life dramatically within only a short period of time. During the first lockdown in spring 2020, many people experienced so-far unprecedented changes in time-use patterns and working conditions.¹ While especially essential workers were exposed to considerably higher workloads, for other groups of employees work hours decreased. In extreme cases they fell to zero, due to short-time work or lay-offs. Many firms switched to remote work and obliged their employees to work from home (Eurofound, 2020). The closing of schools and day-care facilities posed a particular challenge for working parents. Previous research shows that it was mostly women who had to bear the brunt of additional childcare (Derndorfer et al., 2021; Giurge et al., 2021; Hipp & Bünning, 2020). Despite the onerous and emotionally stressful situation of the lockdown, the general pace of life slowed down. Instead of constantly rushing from one to the next appointment, many people experienced so-far unknown times of idleness and empty calendars (Eckhardt & Husemann, 2020).

It is assumed that these changes in time-use patterns and working conditions have also affected the subjective experience of time, such as the perception of time wealth. Previous research suggests that senses of time pressure and feeling rushed increase particularly with the length of paid working time (Beaujot & Andersen, 2007; Mattingly & Sayer, 2006). There is also evidence that domestic work (Stalker, 2014; Sullivan & Gershuny, 2018) or commuting time (Hilbrecht et al., 2014) impacts subjective time experience, while the use of ICT does not seem to have an effect (Sullivan & Gershuny, 2018). However, these studies hardly consider other time-use categories, such as sleep, rest or leisure activities. Also, it remains unclear how particular working conditions, such as remote work or the reconciliation between work and private life, affect the subjective experience of time. Furthermore, the majority of studies investigating the impact of time use is based on cross-sectional data.

In this study, we draw on a unique panel dataset to assess how changes in time use and working conditions during the COVID-19 lockdown affected subjective time wealth. The data was collected in February 2020, briefly before the outbreak of the pandemic, and in April 2020, during the first lockdown, covering 786 employees in Germany. Our data thus provides an exceptional opportunity to trace the changes in time use, working conditions and subjective time wealth during the COVID-19 lockdown in Germany. First-difference regressions enable us to examine which of these changes in time use and working conditions affected subjective time wealth. To unveil particular time-related challenges for different subpopulations, regressions are also conducted separately according to gender and occupational status. Regarding the latter, we consider whether workers were employed in occupations classified as systemically relevant during the pandemic. Such essential occupations include, for example, healthcare, public transport, police or fire department.

This paper is structured as follows. Section 2 reviews the literature examining the relationship between time-use patterns and subjective experience of time, as well as studies reporting changes in time use and working conditions induced by the pandemic. Section 3 describes the data and methods used. In Sect. 4, the results of our descriptive analysis and the regression analyses are reported. Section 5 provides a discussion of the results, while Sect. 6 concludes.

¹ When we use the terms “work”, “workers” or “working conditions”, we usually refer to paid work. When referring to unpaid work, we use the terms “domestic work”, “care” or “housework”.

2 Previous Research

2.1 Time Crunch, Time Use and Labour Market Developments

Despite the huge technological and economic advances, the predicted ‘leisure society’ (Veal, 2018) has not materialised so far. On the contrary, modern societies seem to be characterised by time scarcity and an accelerating pace of life. Scholars have postulated a ‘time squeeze’ (Southerton & Tomlinson, 2005), a ‘time crunch’ (Robinson & Godbey, 1999), or an ‘acceleration society’ (Rosa, 2003, 2013). Empirical accounts confirm that feelings of being rushed or not having time have increased during the last decades (Robinson & Godbey, 2005). This finding might at first seem paradoxical, given that average work hours (paid and unpaid) have remained rather stable in most countries, while leisure time has even increased (Gershuny, 2005; Gershuny & Fisher, 2014). To investigate the time scarcity in modern society, it is thus necessary to discern between the subjective experience of a rushed life on the one hand, and objectively measurable time demands (Szollos, 2009; Zuzanek, 2017).

One of the reasons for the apparent mismatch between subjective time experience and objective time use is that aggregate developments conceal the shifts in time requirements taking place for different groups in society. While the length of the average workweek has hardly changed in the last decades, one could observe a trend towards an increased polarisation of working time and time use (Hermann, 2015; Zuzanek, 2017). This means that a growing share of part-time workers is countered by more employees putting in long hours, who might in turn experience increasing time pressures. Studies based on micro-data find that subjective feelings of time pressure are grounded in objective reality (Clark et al., 1990). Especially the amount of paid working time is identified as a key factor, causing people to feel more rushed or pressed for time (Beaujot & Andersen, 2007; Craig & Baxter, 2016; Hamermesh & Lee, 2007; Laurijssen & Glorieux, 2013; Mattingly & Sayer, 2006).

Changes in household composition and gender relations can also explain some of the aforementioned trends. With the increase in female labour market participation, the share of dual-earner households has been growing (Rubery et al., 1999), which increased the combined working time for couples (Jacobs & Gerson, 2001). However, women’s entrance into paid work has not been mirrored by an equivalent rise in men’s engagement in domestic work (Bryson, 2007). Therefore, the majority of unpaid work is still performed by women (ILO, 2018). In Germany, women spend on average 1.7 times more time on housework and care than men (Hobler et al., 2017). Gender differences in time use are also pertinent with respect to leisure. Several studies suggest that women do not only have less leisure (Druckman et al., 2012; Smetschka et al., 2019), but also lower-quality leisure due to care responsibilities, resulting in more unpredictable, fragmented leisure time (Craig & Mullan, 2013).

Findings on the impact of domestic work on perceived time pressure are less clear, however. While Canadian research suggests that time pressure increases with the number of hours spent on childcare and domestic work (Stalker, 2014), a US study does not find any effects (Mattingly & Sayer, 2006). Other studies find that the amount of unpaid work only matters for women, but not for men (Beaujot & Andersen, 2007; Deding & Lausten, 2011). There is also evidence that time spent on commuting enhances the perception of a time crunch (Deding & Lausten, 2011; Hilbrecht et al., 2014; Stalker, 2014).

Beyond the described tendencies regarding the amount of (paid and unpaid) work hours, working conditions might also influence experiences of time pressure. The shift towards Post-Fordism was accompanied by a deregulation and flexibilisation of working time, resulting in challenges for employees to balance different time requirements (Garhammer, 1995). During the last decades, many developed countries have witnessed a growth in work intensification, causing increased levels of stress (Burchell et al., 2002).

Previous studies investigating subjective experiences of time and its predictors relied on measures such as time affluence (Kasser & Sheldon, 2009), time pressure (Roxburgh, 2004), time crunch (Robinson & Godbey, 1999), or hurriedness (Jansen & Kristof-Brown, 2005). A more comprehensive approach to capture people's subjective experience of time is offered by the concept of *time wealth*. Rooted in the German debate on 'Zeitwohlstand', wealth in time is assumed to enhance sustainable lifestyles while improving human well-being (Reisch, 2001). In addition to having a sufficient amount of disposable time, authors such as Rinderspacher (2002), Garhammer (2002), or Scherhorn (1995) suggest an understanding of time wealth that also comprise autonomy over time use, the ability to synchronise with others' time constraints and rhythms, the plannability of activities, or an adequate pace. In a recent contribution, Geiger et al. (2021) developed a scale to measure general time wealth in everyday life considering these five dimensions. The scale assesses perceived time wealth among individuals and follows the structure of an S-1 model (Eid et al., 2017). This implies that the five time-wealth dimensions are interrelated, but cannot be summed up to one composite index. The subjective experience of having sufficient time was identified as a reference dimension, explaining the variance in the items of all dimensions. In the following section, we provide a brief overview on previous literature discussing pandemic-induced changes in time use and working conditions.

2.2 Time Use and Working Conditions During the Pandemic

The COVID-19 pandemic has fundamentally transformed most people's everyday life. This also relates to people's use and experience of time. For the US, it has been shown that sleeping time and screen time increased, while time spent on sports and socialising declined (Giuntella et al., 2021). The duration of sleep also rose in Italy (Cellini et al., 2020). Mobile tracking data reveals that outdoor recreational activity increased significantly during the lockdown in Oslo (Venter et al., 2020). Gershuny et al. (2021) use time-use diaries to analyse the shifts of time-use patterns according to infection risk. They find that self-care activities (including sleep, personal care, and meals) as well as unpaid work at home increased during the lockdown, while paid work declined. The development of paid working time is also confirmed by official statistics. According to Eurostat (2020) in the second quarter of 2020, work hours decreased by 10.7% in the EU, and by 8.0% in Germany, compared to the previous quarter.

Since many employees started to work from home during the pandemic, one could have expected a more equal distribution of unpaid work between women and men. Although men have expanded the time they spend on housework and childcare, studies for several countries show that during the first months of the pandemic, the bulk of unpaid work was still performed by women — especially mothers (Derndorfer et al., 2021; Giurge et al.,

2021; Sevilla & Smith, 2020; van Tienoven et al., 2021). This pattern also holds true for Germany (Hipp & Bünning, 2020; Kreyenfeld et al., 2020; Zoch et al., 2020). Moreover, female employees in Germany have reduced their working time more strongly than men (Hipp & Bünning, 2020; Reichelt et al., 2021), which indicates a re-traditionalisation of gender roles during the pandemic.

Women also account for the majority of essential workers (Koebe et al., 2020; Zoch et al., 2020), an occupational group that experienced an increased work burden during the pandemic. In Germany, essential workers were less likely to work from home or to work less compared to other workers (Hipp & Bünning, 2020). The requirement of being physically present at work is not only associated with higher risks of infection (Mutambudzi et al., 2021), but also complicates the provision of childcare and home-schooling in times of closed schools and daycare facilities. At the same time, essential workers receive less pay and social recognition than other occupations (Koebe et al., 2020 for Germany).

Turning to the general changes in working conditions, the increased use of remote work was probably the most salient feature of work during the pandemic. In July 2020, 48% of employees in the EU indicated that they worked at home at least sometimes, of which almost half was new to telework (Eurofound, 2020). In April 2020, survey data shows that 27% of German employees were working exclusively from home, and another 17% occasionally (Ahlers et al., 2021).

Working from home increases the risk of blurred boundaries between work and private life (IFES, 2020), as the physical separation between work and living spaces is often lacking. In the EU, almost a quarter of those working from home during the pandemic indicated that they regularly work during their free time. However, the majority of respondents indicated that they would prefer to work from home at least occasionally also after the pandemic (Eurofound, 2020). This generally positive attitude towards remote work might be the result of ceased commuting times and increased possibilities to combine work with other activities (Rubin et al., 2020).

Regarding further changes in working conditions during the pandemic, German data suggests that feelings of being rushed or pressed for time at work slightly declined between 2019 and 2020. The share of respondents who reported to be rushed or pressed for time at work often or very often decreased from 53 to 48%. However, the extent to which German employees are able to arrange their work independently hardly changed between 2019 and 2020 (Institut DGB-Index Gute Arbeit, 2019, 2020).

Against this background, the aim of this study is to answer the following research questions:

RQ 1: How did time wealth, time use and working conditions change for the German workforce during the first lockdown in 2020?

RQ 2: How did the changes in time use affect the subjective experience of time wealth?

RQ 3: Which changes in working conditions affected the subjective experience of time wealth?

To answer these questions we use a unique panel dataset, collected prior to the pandemic and during the first lockdown in spring 2020 in Germany. Drawing on a recently developed scale of time wealth (Geiger et al., 2021), this study follows a holistic approach to measure the subjective experience of time.

3 Data and Methods

3.1 Sample

The data used in this study was gathered in the course of a research project on time wealth. The survey was commissioned to a commercial panel survey institute to ensure representativeness of the sample. The first survey wave was conducted between 12 and 24 February 2020 among 2015 persons between 18 and 67 years old. A quota system was applied to respondents representing the German population regarding age, gender, education level and federal state. In spring 2020, during the first lockdown in Germany,² we decided to conduct an additional ad-hoc wave, allowing us to trace the pandemic-induced changes in time use, working conditions and time wealth. Between 8 and 21 April 2020, the survey was thus repeated among 962 respondents. As we expected the largest changes in time use and subjective time wealth to occur in work life, we limited the second survey wave to employed persons. The second survey was sent out to the 1,298 employed persons of the first wave, resulting in a response rate of approximately 74%.

For our analyses, we only used those observations which were clearly attributable to the first survey wave ($N=931$). As we were particularly interested in the effects of changed working conditions, we also excluded those persons who were on sick leave, quarantine, holidays, or whose working contract has been terminated ($N=106$). Further, we dropped 39 observations where working hours amounted to 0 in the second time period due to short time work. We were left with 786 observations, 422 males and 364 females. As Table B1 in the online appendix shows, our final sample resembles the German workforce very well with regard to age, gender, education level and federal state.

3.2 Measures

Time wealth. Our dependent variable is based on a recently developed scale to assess perceived time wealth by Geiger et al. (2021). This scale is applicable to people in different life situations, whether employed or not. It comprises five dimensions and follows the structure of an S-1 model (Eid et al., 2017). This means that these dimensions are inter-related, but they cannot be added up to one composite time-wealth measure. The S-1 structure also implies that there is one reference dimension explaining the variance in all items. For the purpose of this paper, we chose to focus on the reference dimension of time wealth: the subjective experience of having sufficient time. This core aspect underlying time wealth explains an average of two thirds of variance in all items on time wealth. To measure sufficient time we used the mean of the three items reported by Geiger et al. (2021) (see Table 5 in the appendix). An example item reads “I have enough time to do the things that are important to me”. Items were answered on a 5-point Likert scale (ranging from 1 = “completely disagree” to 5 = “completely agree”). Cronbach’s Alpha for sufficient time amounts to 0.78 for the first survey wave and to 0.79 for the second wave. For the remainder of this

² During the survey period in April 2020, the following rules applied in Germany: People were only allowed to meet one person from another household. It was only allowed to leave the house for work, shopping, doctor visits, or exercising in the fresh air. Schools and nurseries were generally closed, but offered emergency care for children of essential workers. Retail stores were closed, except for essential goods such as supermarkets, drugstores or pharmacies. Restaurants were only allowed to sell take-away food. Leisure, sports and cultural facilities were closed (German Federal Government, 2020a, 2020b).

paper, we are referring to this reference dimension of sufficient time when speaking of time wealth.

Time use. Independent variables contain a set of time-use categories. Daily working hours were calculated by dividing actual working hours per week, including overtime, by five. Respondents were asked what time they currently get up on a weekday, and what time they go to bed, respectively. We used these values to calculate the duration of night sleep. Data on entertainment and culture (e.g., cinema, concerts, theatre), as well as going out (e.g., café, bar, restaurants) was only collected on a weekly basis and then divided by seven. As these activities were virtually not possible during the lockdown, we excluded them in the second survey wave. For the rest of the time-use categories used in this analysis, we asked respondents how many hours per day they currently devote to these activities on a weekday.

Working conditions. To assess working conditions, we considered four different measures. We include a dummy variable indicating whether a person was able to (predominantly) work from home due to the COVID-19 pandemic. The variables on time pressure, autonomous organisation of work schedules, as well as reconciliation with private life were measured on a 5-point Likert scale. The answer options ranged from 1 = “completely disagree” to 5 = “completely agree” (for item wording see Table 6 in the appendix).

Essential occupation. To define essential workers, we followed the classification of the State of Berlin (2020). The occupations assigned to systemically relevant work can be found in Table B2 in the online appendix.

3.3 Data Analysis

We apply first-difference regressions to examine the change in time wealth between February and April 2020. First-difference models only consider the change in certain variables between two points in time, while neglecting the level of these variables. Applied to our case, we examine which changes in time use and working conditions are related to changes in individuals’ subjective time wealth. By restricting our analysis to changes within one individual over time, we are able to control for unobserved heterogeneity emerging from all observed and unobserved stable characteristics of one person (Wooldridge, 2012). As time-constant variables, such as sociodemographic characteristics, cannot be accounted for in first-difference models, we perform the regressions also separately according to gender and essential occupation. Influential outliers are identified by approximating Cook’s distance according to Williams (1987). We exclude observations with a distance $> 10/n$ from the analysis.³

Table 1 shows the descriptive statistics for all time-use categories surveyed. In our regression analysis, we only consider those time-use variables with $\text{Var}(\Delta) > 1$. This is because a crucial condition for first-difference regressions is that the change over time in the explanatory variables has some variation across observations. This qualification fails if the explanatory variable changes by the same amount for every observation (Wooldridge, 2012). Given the lack of established rules we had to apply a heuristic threshold value for the variance. We include the following time-use categories in our regression: work, night sleep, time for rest and time out (without night sleep), care of children and persons in need of care, housework (washing, cooking, cleaning), spending time with friends, family or neighbours at home, as well as media and internet use.

³ The statistical analysis, documented in a Stata do-file, as well as the dataset are available at: https://osf.io/ysd7m/?view_only=dc697214c7c246cfac7f559a45343c97

Table 1 Descriptive statistics of time-use categories, $n = 749$

	M (SD) Feb		M (SD) Apr		$F(p)$	Var(Δ)
Work	7.47 (2.36)		6.57 (2.43)		112.28 (<0.001)	5.42
Sleep	7.50 (1.22)		7.94 (1.33)		76.38 (<0.001)	1.94
Rest	1.99 (2.02)		2.33 (2.24)		12.03 (<0.001)	7.36
Care	1.43 (3.21)		1.81 (4.10)		11.80 (<0.001)	8.93
Housework	1.40 (1.04)		1.61 (1.28)		20.93 (<0.001)	1.69
Friends & family	1.38 (1.46)		1.14 (1.90)		11.04 (<0.001)	4.12
Media & internet	4.24 (2.75)		4.60 (2.96)		10.88 (0.001)	9.63
Eating & drinking	1.33 (0.70)		1.40 (0.70)		6.20 (0.013)	0.69
Sports & activities in nature	0.87 (1.02)		0.89 (0.85)		0.20 (0.656)	1.30
Hobbies & games	0.79 (1.14)		0.85 (1.11)		1.89 (0.170)	1.79
Entertainment & culture	0.12 (0.17)		0.00 (0.00)		369.05 (<0.001)	0.03
Going out	0.23 (0.26)		0.00 (0.00)		579.05 (<0.001)	0.06

M Mean; *n* Sample size; *SD* Standard deviation

Table 2 Descriptive statistics of scale variables, $n = 774$

	$M (SD)$ Feb	$M (SD)$ Apr	$F(p)$	$Var(\Delta)$
Time wealth	2.71 (0.84)	3.02 (0.91)	111.12 (<0.001)	0.63
Time pressure	3.07 (0.14)	2.86 (1.15)	27.35 (<0.001)	1.23
Auton. organis.	3.03 (1.22)	3.10 (1.26)	2.96 (0.086)	1.27
Reconciliation	3.46 (1.02)	3.57 (1.03)	10.83 (0.001)	0.92

M Mean; n Sample size; SD Standard deviation

We also included the time-use categories sports and activities in nature, as well as hobbies and games. At first sight, it might seem surprising that we cannot observe any significant changes in these leisure activities during a lockdown when many activities are restricted or even prohibited by law. However, it should be borne in mind that the item hobbies and games also includes a series of activities that can be conducted at home, such as board games, making music or handicrafts. Regarding the category sports and activities in nature, we assume that the reduced possibilities for indoor sports, such as gyms, has been offset by outdoor activities, such as going for a walk or run in the park.

Table 2 shows the descriptive statistics of all scale variables. As the variance depends on the measurement scale, we set a lower threshold for the variance and include all scale variables with $Var(\Delta) > 0.5$.

To check for collinearity of predictors, Table 3 shows the bivariate correlations for gender, occupational status and all variables included in the regression. Collinearity might occur if the change in one time-use variable is mainly offset by the change in another particular time-use variable. Similarly, the changes in the perceived reconciliation of work and private life might mainly result from a shift to remote work. However, as the bivariate correlations in Table 3 suggest, collinearity is not an issue in our case. Also a VIF test for multicollinearity does not show any problematic values.

4 Results

4.1 Descriptive Analysis: Changes in Time Wealth, Time Use and Working Conditions

Tables 1 and 2 show how time wealth, time use and working conditions changed for the German workforce during the first lockdown in 2020 (RQ 1). We can observe a general increase in perceived time wealth ($t(777) = -10.59$, $p < 0.001$, $d = -0.38$). Prior to the pandemic, time wealth was substantially lower among women and essential workers. Women, however, were able to catch up, as their experience of time wealth was similar to men's during lockdown. Although time wealth also rose for essential workers, their time wealth was still lower compared to non-essential workers in April 2020. With regard to time-use patterns, we see that working hours decreased by almost one hour per day. Also, spending time with friends, family and neighbours at home declined. All other time-use categories, including sleep, rest, care, housework, as well as media and internet use, increased during the lockdown.

Table 3 Bivariate correlations for gender, occupational status, the dependent variable and predictors

Variable	1	2	3	4	5	6	7	8	9	10	12	13	16	17	18
1 Gender															
2 Occup. status	0.06														
3 Δ Time wealth	0.11	-0.04													
4 Δ Work	0.02	0.12	-0.19												
5 Δ Sleep	0.06	-0.01	0.14	-0.08											
6 Δ Rest	0.00	0.01	0.12	-0.09	0.05										
7 Δ Care	0.03	0.03	-0.07	0.05	-0.03	-0.03									
8 Δ House-work	-0.01	0.00	0.07	-0.03	0.03	0.06	0.06								
9 Δ Friends & family	0.05	0.00	0.05	-0.03	0.06	0.07	0.01	0.16							
10 Δ Media & internet	0.05	-0.08	0.09	-0.12	0.08	0.11	-0.08	0.23	0.15						
12 Δ Hobbies	0.04	-0.04	0.14	-0.08	0.05	0.14	0.02	0.06	0.11	0.15					
13 Δ Sport	0.03	-0.07	0.07	-0.12	0.01	0.10	0.03	0.10	0.08	0.24	0.15				
16 Δ Remote work	0.03	-0.22	0.11	-0.02	0.02	0.00	0.04	0.04	0.00	0.09	0.07	0.11			
17 Δ Time pressure	0.07	0.10	-0.20	0.10	-0.03	-0.05	0.06	-0.05	-0.03	-0.02	-0.07	-0.03	-0.11		
18 Δ Auton. organis.	-0.02	-0.04	0.16	-0.10	0.03	0.01	-0.02	0.01	0.04	-0.03	0.00	-0.01	0.09	-0.08	
19 Δ Reconciliation	0.01	-0.08	0.25	-0.12	0.06	0.09	-0.08	0.09	-0.03	0.05	0.06	0.02	0.03	-0.14	0.15

Correlations significant at $p < .01$ are in bold

Table 4 First-difference regressions: changes in time wealth (sufficient time), dependent on changes in time use and working conditions

	Full sample	Non-essen- tial workers	Essen- tial workers	Males	Females
April 2020 (RC: Feb. 2020)	0.165*** (0.032)	0.121** (0.042)	0.217*** (0.048)	0.099* (0.041)	0.235*** (0.051)
<i>Time use</i>					
Work	-0.035** (0.012)	-0.031* (0.013)	-0.042 (0.024)	-0.029* (0.014)	-0.030 (0.018)
Sleep	0.042* (0.017)	-0.001 (0.019)	0.086** (0.027)	0.029 (0.020)	0.073* (0.036)
Rest	0.020* (0.010)	0.010 (0.012)	0.022 (0.015)	0.017 (0.012)	0.019 (0.016)
Care	-0.012 (0.008)	-0.009 (0.011)	-0.014 (0.012)	-0.006 (0.014)	-0.014 (0.010)
Housework	0.028 (0.020)	0.023 (0.026)	0.018 (0.030)	0.048 (0.037)	0.018 (0.028)
Friends & family	0.015 (0.012)	-0.021 (0.014)	0.053** (0.019)	0.012 (0.016)	0.001 (0.020)
Media & internet	0.012 (0.009)	0.017 (0.012)	0.018 (0.012)	-0.009 (0.012)	0.024 (0.013)
Sport & activities in nature	-0.012 (0.020)	-0.033 (0.033)	-0.004 (0.026)	-0.010 (0.031)	-0.017 (0.027)
Hobbies & games	0.034 (0.021)	0.061** (0.022)	-0.012 (0.038)	0.053 (0.027)	0.005 (0.034)
<i>Working conditions</i>					
Remote work	0.122 (0.064)	0.139* (0.069)	0.133 (0.151)	0.029 (0.081)	0.128 (0.098)
Time pressure	-0.080** (0.026)	-0.103** (0.034)	-0.075 (0.040)	-0.132*** (0.035)	-0.096* (0.039)
Autonomous Organisa- tion	0.061** (0.023)	0.027 (0.029)	0.098** (0.035)	0.104*** (0.028)	0.036 (0.034)
Reconciliation	0.148*** (0.034)	0.198*** (0.044)	0.081 (0.045)	0.173*** (0.043)	0.124* (0.053)
N	728	433	290	384	338
R ²	0.265	0.301	0.277	0.282	0.299

Standard errors in parentheses. Coefficients significant at $p < .05$ are in bold

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Our analysis reveals substantial variations of time-use patterns across the considered subgroups (see Table 7 in the appendix). Unsurprisingly, women spend less time for paid work and more time for unpaid work, such as care and housework, compared to men. During the lockdown, paid working time declined while care and housework increased for both genders. Time spent for care increased more strongly for women, thus further exacerbating the already considerable gender-care gap. While women sleep longer hours at night, they

rest less during the day compared to men. Both genders spent more time for sleep and rest during the lockdown; however, sleep increased more strongly for women.

Turning to different occupational groups, we observe that working hours decreased more strongly for non-essential workers during the lockdown. In April 2020, essential workers worked on average 38 minutes longer per day than employees in other occupation groups. At the same time, they spend more time for care and housework, both before and during the lockdown. Regarding sleep and rest, we can see that essential workers generally spend less time on these regenerating activities. Time with friends, family and neighbours at home is similar for both occupation groups. Time spent on media and internet use is lower for essential workers; in contrast to non-essential workers, we cannot find a considerable increase for essential workers.

With regard to working conditions, approximately 25% of our sample indicated that they worked (mostly) from home due to the pandemic, as opposed to 6.8% of employees who usually work from home anyway. On average, respondents perceived less time pressure at work. We also see a slight increase in respondents' ability to independently organise their working days. Moreover, reconciliation between work and private life improved during the lockdown.

Turning to variations across subgroups, we see that females and males switched to remote work to a similar extent. Time pressure at work decreased for both genders, but less strongly for women. Being able to autonomously organise one's working day and reconciliation between work and private life also slightly improved for both women and men. As expected, the share of essential workers who were able to work from home due to the pandemic (13%) is significantly lower compared to other occupation groups (33%). Prior to the pandemic, essential workers performed worse with respect to time pressure, autonomous organisation of working time, and reconciliation. While these indicators improved for non-essential workers during the lockdown, essential workers hardly saw any changes in working conditions.

4.2 Regression Results

We now turn to the results of our regressions to see how the lockdown, changes in time-use patterns and working conditions affected the changes in perceived time wealth during the lockdown (RQ 2). Table 4 shows the results of our first-difference regressions of the change in time wealth on changes in time use and working conditions, reporting unstandardised coefficients. The time dummy for April 2020 captures secular trends during the observed time period that are not captured by changes in other variables included. The positive and significant values suggest that shifts occurred during the lockdown that had a positive effect on time wealth. The coefficients on the time-use variables can be interpreted as follows. Positive coefficients mean that an increase in the time-use category had a positive effect on the change in time wealth, and vice versa. So, the negative coefficient on work hours suggests that an increase in working hours during the lockdown had a negative impact on time wealth. The effect remains significant for non-essential workers and men. Spending more time for sleep positively affected time wealth, especially for essential workers and women. Also, we find that increased time for rest enhanced time wealth. The shifts in other time-use categories did not have any significant effects on time wealth, except for time with family and friends among essential workers, as well as hobbies and games for non-essential workers.

Next, we consider which changes in working conditions affected the subjective experience of time wealth (RQ 3). We find that starting to work (predominantly) from home due to the pandemic had a positive effect on time wealth only for non-essential workers. A reduction in perceived time pressure, more possibilities to autonomously organise one's working day, and particularly an improved reconciliation of work and private life also contributed to an increase in time wealth during the lockdown.

Turning to the regression results for the different subgroups, we see that changes in work hours and sleep time are the time-use categories that remain significant most commonly across subgroups. Non-essential workers benefit mostly from a decrease in work hours and more time for hobbies and games, while essential workers' time wealth increases with more sleep and time for friends and family. Compared to time-use changes, the effects of changed working conditions also remain significant for most subgroups considered, except for essential workers. A decrease in perceived time pressure, as well as an improved reconciliation of work and private life contributed to an increase in time wealth for all subgroups except for essential workers. Switching to remote work, however, seems to be most beneficial for non-essential workers.

5 Discussion

The restrictions induced by the COVID-19 pandemic have transformed people's time use and working conditions fundamentally. Based on a unique panel dataset surveyed prior and during the pandemic, our study takes advantage of this natural field experiment to investigate how these changes manifest for different groups of the labour force, and how they impact the perception of time wealth. Time wealth has been discussed as a complement to material prosperity, which might foster human flourishing while reducing ecological degradation (Reisch, 2001; Schor, 2011). Understanding the drivers and barriers for time wealth is thus key to enhance people's wellbeing within planetary boundaries.

Our first-difference regressions reveal that the increase in perceived time wealth during the pandemic was, among other factors, driven by the reduction in paid work time. We also find that an increase in the length of night sleep positively influences time wealth. The duration of sleep has been declining in Germany over the last decades (Bin et al., 2012). Our data shows that prior to the pandemic, people slept on average 7:31 hours but they indicated a preferred duration of 8:47 hours a night, resulting in a mismatch of 76 minutes between preferred and actual sleeping time. Also, asking respondents what they would mainly use an extra hour per day for, sleep was the most frequently mentioned activity. The pandemic thus enabled employees to reduce their sleep deficit which in turn also improved their perceived time wealth. This result suggests that sleep does not only matter in terms of health and safety, but is also a crucial issue regarding time scarcity in our society which has been rather neglected in time-use research so far. Similarly, time for rest and time out during the day shows a slightly positive effect on time wealth. These results are also good news from an ecological perspective. While several studies point to the positive link between long working hours and environmental degradation (e.g., Buhl & Acosta, 2016; Fitzgerald et al., 2018; Nässén & Larsson, 2015), sleep and rest are two of the most sustainable activities in terms of greenhouse gas emissions per hour (Druckman et al., 2012; Wiedenhofer et al., 2018). Therefore, shorter work hours and spending more time for sleeping and resting does not only enhance subjective time wealth, but also contributes to a sustainable lifestyle. Regarding other time-use categories, it might be surprising that changes in unpaid

work, including housework and care, do not show any significant effects. Previous studies, however, reveal ambivalent findings regarding the impact of unpaid work on subjective time measures (e.g., Beaujot & Andersen, 2007; Mattingly & Sayer, 2006). While some research shows that unpaid work increases feelings of time pressure or rushedness (Stalker, 2014), other studies do not find any effects (Mattingly & Sayer, 2006), or only for women (Beaujot & Andersen, 2007; Deding & Lausten, 2011). Changes in other activities are not significant either, except for time spent with friends, family and neighbours among essential workers, as well as hobbies and games for non-essential workers.

Our models also suggest the presence of a general lockdown effect for all subgroups. The positive coefficients of the time dummy imply that there were obviously some shifts going on during the lockdown that are not captured by the other variables included in our model. The continually positive effects of the lockdown on perceived time wealth for all subgroups might be surprising, as this period was also associated with hardship and many restrictions for a lot of people. However, it must be considered that the data was collected during the very first weeks of the pandemic when people might have experienced the general slowdown as a relief. The results of a third survey wave conducted in spring 2021 will uncover whether the enhancement in time wealth was only a temporary phenomenon, or whether this trend could be sustained throughout the pandemic.

Also, we want to point out that although previous research suggests a positive relation between time wealth and life satisfaction (Geiger et al., 2021), the former is obviously only one among many other factors determining people's wellbeing. Solely fostering time wealth is therefore probably not sufficient to improve overall life satisfaction. Moreover, whether time wealth actually increases well-being depends on the individual context. Unemployed or underemployed persons, for example, might not strive for more discretionary time, and their life satisfaction might indeed benefit from a *decrease* in time wealth as measured in this study.

Turning to specific patterns for the considered subgroups, our results confirm previous research on gender-specific patterns of time use and the experience of time. Women are found to perceive less time wealth than men. This result corresponds to studies showing that women report feeling more rushed (Mattingly & Sayer, 2006; Sullivan & Gershuny, 2018), time-crunched (Beaujot & Andersen, 2007; Deding & Lausten, 2011) or perceiving more time stress (Stalker, 2014). During the pandemic, time spent for care increased more strongly for women. However, care was not identified as a significant predictor in our models. Given the public and academic debate on the particular burden for parents during the pandemic, a more detailed analysis for parents probably would have enabled us to shed light on the particular mechanisms in place. However, as only 27.4% of respondents in our sample have children,⁴ we decided not to provide a separate analysis for working mothers and fathers.

In addition to our findings on the already well-established research on gender-specific time patterns, our study also reveals the specific time-related challenges for essential workers. This occupation group has received particular attention during the COVID-19 pandemic, as the crisis unveiled their indispensability to the functioning of society and the economy. Essential workers do not only receive less pay and social recognition than other occupations (Koebe et al., 2020), they are also found to work more (paid and unpaid hours), while spending less time on sleep and rest. In combination with worse working conditions

⁴ The share in our sample corresponds to official data from Germany, according to which 28% of private households have children (Destatis, 2021).

compared to other occupations, these time-use patterns are also reflected in lower levels of perceived time wealth among essential workers.

6 Conclusion

The aim of the present study was to investigate how changes in time use and working conditions during the COVID-19 lockdown have affected subjective time wealth. Drawing on an exceptional panel dataset collected prior and during the pandemic among German employees, the results of this study show that the increase in perceived time wealth observed during the lockdown was substantially driven by the reduction in paid work time. This finding is in line with a series of previous studies, identifying paid work time as unequivocal factor impairing the subjective experience of time (e.g. Beaujot & Andersen, 2007; Mattingly & Sayer, 2006). Time spent in paid employment sets an upper limit to the time available for other self-determined activities which in turn affects perceived time wealth. We also found that time wealth was enhanced due to more sleep and rest.

While the impact of several time-use categories on perceived time wealth was expectable, it might be surprising that the change in certain working conditions also influenced the general perception of time wealth. Especially reduced time pressure at work, more autonomy in organising one's working day, as well as an improved reconciliation of work and private life contributed to an increase in time wealth. These findings suggest that it is not only the extent of working time, but also certain working conditions that affect employees' subjective time wealth. Interestingly, changed working conditions influenced time wealth more consistently across subgroups than changes in time use. Only for essential workers, shifts in time use appeared to be more important.

This study examined the link between objective time use and the subjective experience of time based on longitudinal data. It thus contributes to our understanding of how to mitigate the widespread time scarcity in modern society. The results of this study imply that labour market policies, such as working-time reductions (Gerold & Nocker, 2018), but also flexible working hours or possibilities for remote work are expected to improve time wealth. These policies should especially target women and essential workers, the two occupation groups who face particular time-related challenges.

Appendix

See Tables 5, 6, 7, 8.

Table 5 Items time wealth
(sufficient time)

I have plenty of spare time
I have enough time to do the things that are important to me
I would like more time for myself. (r)
<i>German original items</i>
Ich habe reichlich freie Zeit
Ich habe genügend Zeit für all die Dinge, die mir wichtig sind
Ich wünsche mir mehr Zeit für mich selbst (r)

Table 6 Items working
conditions

I often have to work under time pressure (<i>time pressure</i>)
I can arrange my working day autonomously (<i>autonomous organisation</i>)
My working hours are well compatible with my private life (<i>reconciliation</i>)
<i>German original items</i>
Ich muss oft unter Zeitdruck arbeiten
Ich kann meinen Arbeitstag selbstständig einteilen
Meine Arbeitszeiten lassen sich gut mit meinem Privatleben vereinbaren

Table 7 Descriptive statistics of time-use categories for subsamples

	Non-essential workers (N=453)				Essential workers (N=296)			
	M (SD) tl	M (SD) t2	F(p)	Var(Δ)	M (SD) tl	M (SD) t2	F(p)	Var(Δ)
Work	7.41 (2.34)	6.28 (2.51)	91.90 (<0.001)	6.29	7.56 (2.39)	7.02 (2.23)	23.12 (<0.001)	3.91
Sleep	7.54 (1.18)	8.00 (1.33)	51.95 (<0.001)	1.85	7.43 (1.27)	7.85 (1.34)	25.13 (<0.001)	2.08
Rest	2.04 (2.10)	2.34 (2.21)	5.18 (0.023)	8.48	1.91 (1.89)	2.30 (2.28)	8.01 (0.005)	5.68
Care	1.13 (2.73)	1.39 (3.57)	4.49 (0.035)	6.71	1.90 (3.80)	2.45 (4.73)	7.40 (0.007)	12.31
Housework	1.34 (1.01)	1.54 (1.20)	12.83 (<0.001)	1.70	1.49 (1.07)	1.70 (1.39)	8.10 (0.005)	1.67
Friends & family	1.37 (1.35)	1.12 (1.94)	6.81 (0.009)	4.16	1.40 (1.63)	1.16 (1.85)	4.21 (0.041)	4.07
Media & internet	4.12 (2.64)	4.70 (3.05)	16.74 (<0.001)	9.14	4.43 (2.90)	4.45 (2.82)	0.02 (0.889)	10.24
Eating & drinking	1.33 (0.71)	1.42 (0.71)	5.79 (0.017)	0.76	1.33 (0.69)	1.37 (0.57)	0.88 (0.350)	0.59
Sports & activities in nature	0.83 (0.85)	0.90 (0.86)	2.63 (0.106)	0.96	0.94 (1.24)	0.87 (0.84)	0.83 (0.363)	1.81
Hobbies & games	0.80 (1.20)	0.90 (1.14)	2.47 (0.117)	2.02	0.78 (1.06)	0.79 (1.06)	0.05 (0.828)	1.44
Entertainment & culture	0.12 (0.17)	0.00 (0.00)	226.23 (<0.001)	0.03	0.11 (0.16)	0.00 (0.00)	143.32 (<0.001)	0.03
Going out	0.24 (2.6)	0.00 (0.00)	375.88 (<0.001)	0.07	0.21 (0.25)	0.00 (0.00)	204.81 (<0.001)	0.06
Males (N=400)								
	Males (N=400)				Females (N=349)			
	M (SD) tl	M (SD) t2	F(p)	Var(Δ)	M (SD) tl	M (SD) t2	F(p)	Var(Δ)
Work	7.94 (2.15)	7.02 (2.34)	59.50 (<0.001)	5.79	6.93 (2.48)	6.06 (2.43)	52.83 (<0.001)	5.00
Sleep	7.41 (1.27)	7.79 (1.44)	24.62 (<0.001)	2.32	7.60 (1.15)	8.12 (1.17)	63.57 (<0.001)	1.49
Rest	2.06 (2.04)	2.43 (2.25)	7.30 (0.007)	7.70	1.90 (1.99)	2.21 (2.22)	4.77 (0.030)	6.98
Care	0.94 (2.18)	1.20 (2.92)	6.31 (0.012)	4.37	1.99 (4.02)	2.50 (5.04)	6.28 (0.013)	14.23
Housework	1.12 (0.78)	1.33 (1.04)	17.42 (<0.001)	1.05	1.71 (1.19)	1.93 (1.45)	7.05 (0.008)	2.43
Friends & family	1.35 (1.52)	1.01 (1.71)	11.92 (<0.001)	4.04	1.41 (1.40)	1.28 (2.10)	1.47 (0.227)	4.20
Media & internet	4.35 (2.62)	4.61 (2.88)	3.34 (0.069)	8.69	4.11 (2.89)	4.59 (3.06)	7.94 (0.005)	4.54
Eating & drinking	1.27 (0.64)	1.35 (0.69)	4.23 (0.040)	0.73	1.40 (0.77)	1.47 (0.69)	2.12 (0.146)	0.65
Sports & activities in nature	0.86 (0.87)	0.86 (0.86)	0.00 (1.00)	1.14	0.89 (1.17)	0.93 (0.84)	0.34 (0.559)	1.50

Table 7 (continued)

	Males (N = 400)						Females (N = 349)					
	M (SD)	t1	M (SD)	t2	F(p)	Var(Δ)	M (SD)	t1	M (SD)	t2	F(p)	Var(Δ)
Hobbies & games	0.92	(1.18)	0.93	(1.19)	0.03 (0.871)	1.99	0.64	(1.09)	0.77	(0.99)	3.33 (0.069)	1.56
Entertainment & culture	0.12	(0.17)	0.00	(0.00)	215.49 (<0.001)	0.03	0.11	(0.16)	0.00	(0.00)	154.26 (<0.001)	0.03
Going out	0.24	(0.27)	0.00	(0.00)	324.70 (<0.001)	0.07	0.21	(0.25)	0.00	(0.00)	255.56 (<0.001)	0.06

M Mean; N Sample size; SD Standard deviation

Table 8 Descriptive statistics of scale variables for subsamples

	Non-essential workers (N = 466)				Essential workers (N = 308)			
	M (SD) t1	M (SD) t2	F(p)	Var(Δ)	M (SD) t1	M (SD) t2	F(p)	Var(Δ)
Time wealth	2.81 (0.83)	3.14 (0.87)	79.44 (<0.001)	0.63	2.58 (0.83)	2.84 (0.94)	33.09 (<0.001)	0.64
Time pressure	3.00 (1.07)	2.70 (1.07)	34.51 (<0.001)	1.18	3.18 (1.22)	3.10 (1.24)	1.38 (0.242)	1.27
Autonomous organisation	3.25 (1.17)	3.36 (1.19)	4.28 (0.039)	1.26	2.71 (1.22)	2.72 (1.26)	0.04 (0.842)	1.29
Reconciliation	3.58 (0.95)	3.75 (0.94)	16.96 (<0.001)	0.84	3.29 (1.10)	3.31 (1.10)	0.11 (0.736)	1.03
Males (N = 415)								
	M (SD) t1	M (SD) t2	F(p)	Var(Δ)				
Time wealth	2.81 (0.81)	3.03 (0.88)	33.37 (<0.001)	0.59	2.61 (0.86)	3.00 (0.95)	85.33 (<0.001)	0.67
Time pressure	3.04 (1.13)	2.75 (1.13)	29.26 (<0.001)	1.19	3.10 (1.15)	2.99 (1.18)	3.76 (0.053)	1.27
Autonomous organisation	3.07 (1.20)	3.17 (1.21)	3.58 (0.059)	1.18	2.99 (1.25)	3.03 (1.31)	0.29 (0.589)	1.39
Reconciliation	3.47 (1.00)	3.57 (1.04)	4.61 (0.032)	0.97	3.45 (1.05)	3.58 (1.01)	6.44 (0.012)	0.87

M Mean; *N* Sample size; *SD* Standard deviation

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