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The state of research on the long-term effects of the four-day week on employees

Results of a literature analysis

AT A GLANCE

- The increased debates on the four-day week have not yet led to an increased number of empirically based scholarly publications on the effects of reduced working hours on employees.

- The studies conducted over the last six years also show that in most cases in which working time reductions were implemented via a four-day week, these turned out to be significantly lower in practice than had been announced. Furthermore, the studies do not differentiate sufficiently between different models of working time reduction.

- Nevertheless, all in all, at least in the short term, the studies indicate that the effects of reduced working hours on mental and physical health are mostly positive. The respondents also report an improvement in their work-life balance and time conflicts. Whether

reductions in working hours also lead to a redistribution of care and paid work remains unclear.

– Future research should focus more strongly on the longevity and sustainability of the effects. In addition, a systematic distinction should be made between different working time reduction models. One possibility for this is for academic researchers to monitor the implementation of collective agreements with corresponding working time-related agreements.

ABSTRACT

The present study analyses the last six years (2018 to 2024) of research on the four-day week, including its impact on mental and physical health, family and work-life balance, as well as employees' employment and career trajectories. This analysis is based on a literature review and supported by qualitative and quantitative methods. The study includes assessments provided by academics and practitioners with expertise in the area. The findings of this study demonstrate that research on this topic has hitherto focused primarily on the systematization of findings and case studies. The findings of this study indicate an overall positive correlation between working time reduction (WTR) and improved mental and physical health. This is also indicated by our own quantitative analysis based on data from the Socio-Economic Panel (SOEP). The studies also report an improvement in work-life balance and time conflicts. The extent to which WTR also results in a redistribution of care and paid work remains uncertain. It is recommended that a theoretical model for sustainable WTR effects be developed and tested using specific data and longitudinal methods.

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1 Introduction and conceptual base

1.1. INTRODUCTION

According to the latest working time report from the Federal Institute for Occupational Safety and Health (BAuA), the share of those who would like to reduce their working hours has risen further. In 2021, 53% of those in employment and working at least 10 hours per week declared that they would like to work shorter hours, even if that meant taking a pay cut. The share of men wanting to work shorter hours was higher than that of women (57 % vs. 49 %). Fifty-six per cent of respondents who expressed a desire for shorter working hours stated that they did not (any longer) have children living with them, 54% were living with children and a partner and 52% were single. A clear majority (63%) of those expressing a preference for shorter working hours were working full time. However, even among the part-timers, almost one in every four stated that they would like to work shorter hours (24%) (BAuA 2022, p. 191). Thus, it can be concluded from the findings that the desire for shorter working hours has now spread to virtually all categories of employees. Alongside this desire to work shorter hours, the need for greater working time **flexibility** is also increasing – both for dynamic working arrangements that make it possible to adapt daily working time to situations requiring unplanned time away from work (examples include flexitime, trust-based working and working from home) and for life stage-related flexibility that enables employees temporarily to reduce their working time in order to meet the demands of their private life (examples include parental leave, family care leave and bridging part-time work) (Kümmerling et al. 2023). This combined desire for greater flexibility and a reduction in working time probably explains, at least in part, the renewed interest in working time models such as the four-day week, which first peaked as long ago as the 1970s but was concentrated mainly in the USA (Campbell 2024; Veal 2023). Hedges reported that, as early as 1971, some 600 companies in the USA were offering their employees a form of four-day week; most of these were smaller firms operating nationwide (Hedges 1971, cited in Campbell 2024, p. 1797). Beyond this, however, the idea did not initially catch on, possibly also because employers in Western Europe were banking on the advantages of flexitime (Campbell 2024, p. 1796). Only recently, in the wake of the positive experiences with the so-called

‘trials’ in the UK, Ireland and, most recently, in Germany as well, has the four-day week been discussed by the general public, so much so that at times there has even been talk of a veritable ‘hype’. At the same time, assessments of the four-day week could not be more different. At one end of the spectrum of opinions, the four-day week is seen as a production miracle (catchphrase: 100% productivity with 80% working time and 100% pay); at the other, there is nothing less than a warning that it would put the entire German economy at risk. While some see the four-day week as an opportunity for hitherto underrepresented groups, particularly women, to participate more fully in the labour market, as well as for a redistribution of (unpaid) care and paid work and an increase in employment, others are warning of (old-age) poverty, work intensification and an aggravation of existing shortages of skilled workers and other labour. Assessments of the effects on employees’ health and general well-being also diverge. Some highlight the positive effects that more leisure time might have on physical and mental health and on a more gender-equitable redistribution of work (see Chung 2022), while others fear that reduced working time could lead to increased work intensification (Herrmann 2023, interview with Heinz-Josef Bontrup), more stress and, as a result, more absences due to illness.

Why are the assessments so diametrically opposed? One reason is the lack of a clear definition of what the notion of the ‘four-day week’ actually means, another that research in this area remains diffuse and anecdotal and has so far failed to address the subject systematically. The debate is often conducted less on the basis of expert academic discourse than from purely ideological standpoints. In this regard, Campbell (2023) notes that the current debate is dominated primarily by pilot studies, newspaper reports and advocates of a four-day week. In contrast, academic contributions, particularly those that have been peer-reviewed or have investigated the long-term effects of switching to a four-day week, are rare. Hanbury et al. (2023, p. 2) adopt a similarly critical stance, correctly finding that “exactly which positive or negative effects emerge from WTRs [working time reductions, authors’ note] – and to what extent – depends on the conceptualization of WTR policies though.” However, they go on to say that there are hardly any studies that deal with the differences in the effects of a variety of conceptualisations. “Hence, there is also a lack of research exploring what conceptualizations of WTRs could maximize their positive effects (…) while minimizing possible negative effects.“ (Hanbury et al. 2023, p. 2)

The initial focus of this paper is to contribute to the further systematisation of existing research on the four-day week. Drawing on a comprehensive literature analysis, the state of research, particularly on the long-term and life course-oriented effects of the switch to working time models such as the four-day week, will be presented and evaluated, as little is known about these effects. The focus of the literature analysis is on the effects that a four-day week or more general working time reduction models have on the individual. Effects at company level,

e.g. on productivity, team work or sick leave, will not be considered here. Only academic articles published since 2018 and whose methodology is based on longitudinal analyses or quasi-experiments will be included in our presentation. We also discussed the results of our overview evaluation with two academic experts and a trade unionist, with whom we conducted semi-structured interviews lasting an average of 45 minutes each on the state of research and the possible implementation of the four-day week. In section 3, we present the results of a longitudinal analysis using Socio-Economic Panel (SOEP) data and address the individual effects of a working time reduction on employees' subjective health over time. In the concluding section, the results are summarised and gaps in the research identified.

1.2. THE 'FOUR-DAY WEEK' WORKING TIME MODEL – CLOSING IN ON A VAGUE CONCEPT

The experts we interviewed about the four-day week shared the impression, noted in the previous section, that a good deal of 'hype' currently surrounds the notion of the four-day week, even though, from both an academic and trade union perspective, there seems recently to have been a decline in the attention being paid to the idea:

> However, I must also say that, from our perspective, the debate on the four-day week has died down rather in 2024. It was much livelier in 2022 and 2023 than it is now. Back then, the union was receiving two enquiries a week, so to speak, about the four-day week from the press. My feeling is that interest in the issue has died away a bit. Nevertheless, it is of course still relevant and it's still a live issue. (trade unionist)

"I'm also very aware of this hype, or something very much like hype, around the notion of the four-day week. However, I have the impression that it's cooled off rather this year". (Academic researcher 1)

Ultimately, however, it remains unclear what the four-day week "buzzword" actually means: however catchy the term may be, it continues to be used very imprecisely. This lack of clarity means that completely different working time models, with their presumed different effects on employees that, as we will show, are only partially proven empirically, are being intermixed. Most people associate a 'four-day week' with a shorter four-day working week and long weekends. However, even in the much-cited UK pilot study[1], which has also attracted

[1] As this study is referred to repeatedly throughout the article, its key points are presented below. The British pilot study of the four-day week was conducted in 61 companies in the second half of 2022 and aimed to investigate the effects of a four-day week on employees and companies over a period of six months. The participating companies were mainly smaller companies from the service sector. The study was based on a pretest/post-test design and included both administrative data and employee survey data. One feature of this study is that it was left to the companies themselves to decide how they would implement the reduction in working hours, i.e. whether they opted for a shorter working week or shorter working days or a mixture of the two. (The majority of

attention beyond the professional community, very different forms of working time reduction were trialled: “A range of four-day weeks were therefore developed, from classic ‘Friday off’ models, to ‘staggered’, ‘decentralised’, ‘annualised’, and ‘conditional’ structures. (Lewis et al. 2023, p. 5)

It can be concluded from this that, as catchy as the term four-day week is, it is, nevertheless, a narrow concept, as it implies the shortening of the traditional working day by a whole day and thus directs the focus of attention on to long weekends and more leisure time (regardless of the fact that not all companies give all employees the same day of the week off). However, the idea behind the four-day week is much broader and encompasses “a movement set to shorten the working hours of full-time workers without a reduction in pay” (Chung 2022, S. 551) – regardless of the actual distribution of the shortened working week (Kümmerling in press.). This means that, underneath the term ‘four-day week’, there lie concealed a number of different working time reduction models that do not necessarily mean working only four days a week. Moreover, there are also four-day week models that do not involve a working time reduction at all and instead increase daily working time, as we explain below. This is also reflected in the coexistence of different models in company practice, as the following quotation from a trade union perspective shows:

> It is also important to us as a trade union that the four-day week is not thought of as a rigid model. In other words, not as a model in which a company operates only from Monday to Thursday and the rest of week everyone is off and the company shuts down. […] In other words, when the union talks about a four-day week, we’re actually talking about a flexible working time reduction model. (Trade unionist)

In order to establish academic comprehensibility and avoid the possibility that impact assumptions might be falsified, we consider clarification to be essential. Zander (2024) identifies three different types of four-day week (Type 1: unchanged working time duration with a different distribution, wages remain unchanged; Type 2: working time reduction with wage compensation; Type 3: working time reduction without wage compensation), the last of which constitutes nothing other than the equivalent of near full-time part-time working, with the known risks associated with it (lower earnings, possible risk of poverty in old age); this last type is not part of the literature analysis here. Hybrid forms of these types also exist. The distinction Zander makes is, at first glance, plausible and understandable. In our opinion, however, an advance typology from which academic studies with corresponding hypotheses could ultimately be derived should take into account the exact distribution of working hours, with some models even involving five-day working (see below).

companies opted for a shorter working week). The results were largely positive, with 56 of the participating companies stating that they wanted to retain the four-day week even after the pilot phase had ended (Lewis et al. 2023).

Type 1 refers to the Belgian model, which in the US context is also called the "compressed working week" (Kümmerling and Lehndorff 2014, p. 29). A legal entitlement to a four-day week while at the same time maintaining a weekly working time of 38 hours has been in force in Belgium since November 2022. In the new legal situation, however, working hours may be distributed differently. Instead of working approximately eight hours five days a week, a four-day week with a working day of approximately ten hours is now permissible. A further variant of the Belgian model, namely the option of varying working time over the course of a month, has to date received less attention. Accordingly, it would also be possible to increase weekly working time to more than 40 hours in the first two weeks of the month and work correspondingly fewer hours in the following two weeks (Sell 2024). Both implementations of the four-day week in Belgium are intended simply to redistribute working time without touching the basic principles of the 40-hour week.

We make a distinction between this model and those approaches that involve a reduction in working time. We will consider here those with either full (Zander's Type 2) or partial wage compensation (hybrid form). The aim of these approaches is to reduce full-time working hours to about 32 hours, although the scope of application may vary. Industry-specific, company- or department-wide or individual choice frameworks are discussed. There are also differences in the distribution of the 32 hours over the days of the week. The 'four-day week' buzzword implies that the five-day week will be reduced to four days. However, there are also models in which the 32 hours are still distributed over five days and it is only the duration of daily working time that is reduced.

While the recording of working time preferences in the SOEP and BAuA surveys is now firmly anchored in working time research, surveys on the desired distribution of work or even on the four-day week are rarer[2]. According to a survey carried out by Forsa (2022) on the so-called 'Belgian model' of the four-day week (see above), a majority of 59% of the working population would opt for a four-day week if the total number of hours worked remained unchanged, while 31% would want to retain the five-day week. The four-day model is particularly favoured by relatively young employees (30 to 44 year olds: 64%) and those with a higher level of education (62%). Belgian studies on the actual take-up of the option to spread the working week over four days show that preferences and reality often do not coincide. Various surveys have shown that the share of employees who take advantage of the opportunity to switch to a four-day week varies between 0.45% and 0.8%. Blue-collar workers appear to opt for the four-day week slightly more often than white-collar workers, while employees in small

[2] The working time survey already cited also actually asks about the number of preferred working days, but does not relate this to the various models of the four-day week (BAuA 2022).

companies and micro-enterprises are more likely to do so than those in large companies (Sell 2024).

In a recent study by the Hans Böckler Foundation (Lott and Windscheid 2023) that asked full-time dependent employees about their assessments of a four-day week with a reduction in working hours, more than 80% of respondents declared themselves in favour. However, only around 8% were also willing to accept a pay cut in return. When asked about their reasons for wanting to reduce their working hours, an overwhelming majority of 97% (with multiple answers possible) stated that they wanted to have more time for themselves, 89% wanted more time for their families, 88% wanted more time for hobbies, voluntary activities or sports, 75% wanted to reduce their workload and 31% wanted to reduce their working hours for health reasons.

Nevertheless, some 17% of respondents in the study declared themselves opposed to reducing their working hours (Lott and Windscheid 2023). A number of important insights can be gained from a closer examination of the reasons given for opposing a four-day week. Besides the enjoyment to be had from work, the main objections to a reduction in working time were linked to work organisation. It should be noted that no attempt was made to differentiate this assessment by gender, parenthood, possible caring responsibilities, life stage and financial standing. Consequently, we know very little about the respondents, their socio-economic backgrounds or their motives, which are ultimately decisive for researching and assessing the individual long-term effects on different groups of employees. And we know even less about those who are actually working in a new form of four-day week.

1.3. EXPECTED EFFECTS OF A SWITCH TO THE FOUR-DAY WEEK[3]

Examination of the theoretical assumptions and the empirical findings to date on the effects of a change in the traditional working time norm of the five-day week shows that assessments of the effects on individuals are predominantly positive. This applies to both working time models based on the Belgian model of a compressed or condensed four-day week (Kümmerling and Lehndorff 2014; for a critical view e.g. Golden 2012) and to the four-day week involving a working time reduction (Lewis et al. 2023; for a critical view De Spiegelaere and Piasna 2017; Thörel et al. 2020). However, it can reasonably be assumed that the structuring of the four-day week may have divergent effects on different individuals, which may vary depending on age or life stage. For example, it is known from the literature on the effects of long working times that employees'

[3] Since the focus of the present paper is on the long-term *individual* effects, any possible positive or negative effects at company level or on the work process itself, such as labour productivity, teamwork or innovative capacity, are omitted here but readers are referred to the statements in Jansen-Preilowski et al. (2020) and the sources cited there.

risk of having an accident rises disproportionately after eight hours. (Arlinghaus 2022). Does this mean that recovery after a six-hour day is likely to be better than after eight hours? Or does an additional whole day off work have a more restorative or health-promoting effect – and if so, do these effects also occur if the additional day off does not result in a long weekend but falls in the middle of the week? Are the effects the same across the various age groups (regardless of life stage) or are younger employees, for example, better able to cope with longer working days for a limited period of time than their older counterparts? Or can we not make such sweeping statements and do other factors, particularly the characteristics of the job in question, such as work intensity, physical stress or perceived working time autonomy, also play a role?

Regardless of the effects on recovery or health, the effects on reconcilability - or more broadly on work-life balance – are perhaps different. Thus, the experts we interviewed (see below) and articles in the literature (e.g. Fagnani and Letablier 2004) note reprovingly that shortening the working week by a day – regardless of whether employees work eight or ten hours – would be hardly likely to solve the reconcilability problems of workers with care responsibilities (mostly women), who would continue to be bound by nursery and school opening hours. However, early studies on the compressed or condensed working week did show positive effects on work-life balance (Kümmerling and Lehndorff 2014).

It is also to be expected that work organisation and work volume will have an impact on the long-term individual effects of a switch to a four-day week. This is because it makes a difference whether the working time reduction is implemented through work intensification alone or a restructuring or reorganisation of the work processes and whether additional staff are hired. For example, the companies that took part in the *4-Day Week Pilot Study* cited above made what in some cases were massive changes as part of the changeover (Lewis et al. 2023). Greater digitalisation, fewer and possibly shorter meetings and other potential 'time sinks' were intended to make work more efficient and thereby facilitate the reduction in working time.[4] Lewis et al. (2023) describe the effects of this approach as largely positive. Employees were sick less often, worked more efficiently and reported improvements in their work-life balance, so that the overwhelming majority of the companies will stick with the working time reduction even beyond the pilot phase. However, there are as yet no further findings on how these changes will affect different groups of employees, their mental and physical health and their employment and life trajectories in the long term. It is also unclear whether the positive effects that have been described, particularly over a short observation period, are due largely to the improvements in work organisation and the employees' experience of participation or are actually the result of the working time reduction, which was significantly less than a working day (Frey 2023.)

[4] It should be noted that the participating companies were able to choose different models of the four-day week.

2 Results of the literature analysis

The aim of the literature analysis was to produce a systematic overview of publications on the four-day week since 2018. One focus of the literature search was on quantitative empirical texts that spotlight the long-term individual and/or life phase-dependent effects of a shortened working week with at least partial wage equalisation (irrespective of the chosen mode of implementation). We chose the following as our topics of interest in the evaluated studies: the reconciliation of family life and paid work, subjective assessments of the work-life balance and health as well as health-promoting behaviours and employment histories.

On this basis, we conducted a systematic search in relevant databases, such as online catalogues and libraries (WorldCat, Scopus, Web of Science and JStor, among others) and searched for scholarly literature such as studies and meta-analyses. It soon became evident that the effects of a working time reduction are often the subject of interdisciplinary research involving various specialist disciplines and that their focus therefore varies. Thus the current research spans the social sciences, economics, management and ethics, psychology, medicine, neuroscience, gender research as well as environmental, development and sustainability studies. References and cross-references within the specialist articles were also checked in order to identify further potential sources. In addition, we searched through recent conference papers and debates among academics and other experts, some of which were also to be found in populist scientific formats. The literature search took place in the second quarter of 2024 and was extended in December 2024.

The literature review itself included only quantitative empirical analyses, longitudinal studies, quasi-experimental designs and meta-analyses published between 2018 and 2024. It is striking that the literature reviews and meta-analyses cited by us in particular report on studies that cover a much longer observation period (going back to the last century) – but have comparatively few sources. This assessment is also shared by Boulin (2024), who initially envisaged a five-year observation period for his literature analysis on the effects of the four-day week; he extended it to include important studies of the working time reforms introduced at the end of the 1990s. In his study, Boulin makes a distinction

between the effects of working time reduction on employment and productivity, on the one hand, and the social (e.g. those related to health and work-life balance) and environmental effects, on the other, and concludes that most articles deal with the employment effects of reduced working hours, while less attention is paid to the other three topics.

A literature analysis by Jansen-Preilowski et al. (2020) of English- and German-language texts on the effect of working time reductions on mental health published between 2001 and 2020 produced 114 relevant articles, of which only 13 ultimately made it in to the later analysis since further examination showed that the selection criteria (actual implementation of a working time reduction with no change in pay) had not been met. Slightly more sources (30) were found by Hanbury et al. (2023), who were looking for publications on the social, economic and environmental effects of working time reductions in German- and English-speaking countries, with a focus solely on longitudinal and quasi-experimental designs from the period 1999-2021. Accordingly, Veal (2023) notes that academic publications on the effects of the four-day week are scarce, while Campbell (2024, p. 1804) also shows in an impressive analysis of the last 50 years that "scholarly publications are notably skewed towards the 1970s with a scarcity of contemporary research".

We share this finding. Publications on the subject of the four-day week are by no means scarce, but only in exceptional cases are they based on empirical data gathered and analysed in a scholarly fashion; they are much more likely to be underpinned by conceptual ideas, opinions or individual case analyses that are difficult to generalise. This is confirmed by the academic experts we interviewed:

> I think there is simply still too little research on this. There are a lot of projects, a lot of pilot projects. Iceland is of course a good example, because it has been introduced there and I hope a lot will be published there as soon as possible. Because I think the research situation is relatively unequivocal in many areas, with a reduction in stress and a better work-life balance, but it always relates to relatively small models (researcher 1).

We focused not solely on the effects that working time reductions at company level only had on employees but also included studies that investigated the effects of collective (e.g. statutory) changes in working time, such as those that looked at the effects of the introduction of the legally mandated 35-hour week in France (Berniell und Bietenbeck 2020) or the reduction in working time from 48 to 40 hours per week by eliminating Saturday as a working day for state employees in China (Hu et al. 2024). On the other hand, studies that analysed employees' transition to traditional part-time working were not included in the evaluation.

Overall, the current literature provides few findings on the thematic areas of interest to us – which underscores the need for research. In particular, there are

virtually no studies on long-term and lasting effects. In sum, it can be said that the increased public interest in the four-day week is not reflected in an increased number of scholarly publications on the subject. Current research is focused above all on the systematisation of existing findings in the context of literature reviews or meta-analyses or is characterised by case studies and pilot studies. Although some longitudinal studies and investigations based on quasi-experimental designs do exist, these generally do not allow any conclusions to be drawn on the long-term effects of working time reductions, since they often do not extend beyond a period of six (Lewis et al. 2023) or 18 months (Barck-Holst 2021). One exception is a study from Austria, that investigated the effects of a working time reduction in a small company and found positive impacts on employees' job satisfaction, work-life balance and health (Arlinghaus et al. 2024). Due to the small number of cases and the survey design, it is difficult to infer any transferable statements from the results.

Viewed overall, it is clear from the literature we analysed that gender effects or the effects of the life phase or the type of working time reduction adopted remain regularly underreported (Campbell 2024; Hanbury et al. 2023). In this regard, Veal (2023) makes a further point of importance for the assessment of the results of studies on the four-day week, namely that the participating companies decide of their own volition to change their working time model. Generally, therefore, this is a positive selection of companies, that for certain reasons assume, that their work can be organised differently in terms of times. These companies are often small and medium-sized businesses, many of them in the service sector, or government organisations (e.g. Brackmann et al. 2024; Lewis et al. 2023). It is therefore questionable whether and to what extent the findings from such studies can be transferred to other companies.

2.1. PHYSICAL AND MENTAL HEALTH

The vast majority of the studies we identified are concerned with the effects of reduced working hours on health. Numerous health indicators are examined. While some focus on reported behaviours (regular drinking, smoking, physical activity), others concentrated on obesity, insomnia or, more generally, assessments of well-being. A third strand of research is concerned with indicators of mental health and records feelings of stress or signs of burn-out, for example. All the studies cited report respondents' self-assessments.[5] We were unable to find any results for more objective measurements, e.g. of weight and height as the basis for calculating BMI or cortisol measurements. In this regard, the results of the study conducted in 45 companies by the University of Münster (Brackmann

[5] On the problematic of self-assessments, see Campbell (2024). In his paper, Campbell discusses the fact that as a rule employees prefer shorter working weeks or days and that there is a risk that their answers are therefore skewed in that direction.

et al. 2024), in which cortisol levels were measured and subjects' stress levels recorded using a smartwatch, are of interest. While the analyses of the cortisol measurements were not available at the time this study was published, the evaluations of the smartwatches show that employees working a four-day week experience significantly fewer minutes of stress in the course of the week than those in the control group.

The results of the UK pilot study are not entirely unambiguous in this respect. Thirty-nine per cent of respondents reported that their subjective perception of stress had diminished as a consequence of the change in working time, 48% felt it had remained unchanged and around one in seven declared that they felt their stress levels had increased after the working time reduction. The effects on the development of burn-out symptoms among employees, which were measured by means of various items on fatigue, exhaustion and frustration, are more convincing, with 71% of respondents reporting a reduction in burn-out symptoms, 22% observing no change and 7% reporting an increase. With regard to perceptions of physical health, 37% of respondents reported an improvement, although 18% reported a deterioration, while 45% perceived no change. These results could be related to improved sleep and reduced fatigue: 40% of the respondents declared that their sleep problems had eased (although 15% reported a deterioration) and 46% said they felt less tired, although 14% said they felt more tired (Frey 2023, p. 19). Overall, the results seem promising and point in a positive direction. However, the articles by Lewis et al. (2023) and Frey (2023) often lack background statistical information, so that the scholarly ranking must remain unclear. Thus, for example, the results are not sufficiently broken down, for example with regard to the chosen working time model, gender, life phase or number of children in the household. The presentation of the results also concentrates on bivariate analyses.

The results of the *4 Day Week Global Trials* outlined above have undergone a differentiated examination in a comprehensive study (Fan et al. 2023) using multivariate methods and controlling for various individual and organisational characteristics. Data from 141 participating companies and 2,896 employees were analysed for the study. It was found that companies that reduce their weekly working times by 8 hours or more achieve significant improvements in burn-out, job satisfaction and mental health, as well as marginal improvements in physical health compared with control companies with unchanged working times. Similar results were obtained for companies with reductions of between 5 and 7 hours and between 1 and 4 hours. The analysis of individual working hours showed that greater reductions in working time led to greater improvements in subjective well-being. Employees whose working time had been reduced by eight hours or more, for example, recorded a significantly greater reduction in burn-out than employees with smaller working time reductions. Moreover, sub-group analyses

showed that only a few interaction terms were statistically significant. Nevertheless, the significant results indicate that supervisors derive greater benefits for their well-being from reduced working hours than other employee groups.
In connection with the working time reductions, three mediators were identified as significant drivers of improvements: the perceived ability to work, reduced sleep disturbances and decreased fatigue. These factors contributed significantly to the positive effects on well-being.

A French study (Berniell and Bietenbeck 2020) also used a longitudinal design over two waves (1998 and 2002) to investigate the effects of company-level working time reductions on the health of male employees. The starting point for the investigation was a reform of French labour law (which has since been revised again) that reduced the standard working week from 39 to 35 hours. Although respondents' average weekly working time had fallen less than had been anticipated (depending on the method of calculation, by an average of 2.5 or 3.4 hours), positive effects on health could be observed. The authors adopted a difference-in-differences approach and used lagged-dependent variable models to compare male employees in companies that had already implemented the working time reduction with those in companies that had not put the reduction into practice. The share of smokers fell by 16% compared with 1998; a reduction in BMI and an improvement in respondents' subjective health could also be inferred from the data, although these effects could not be interpreted as unambiguously as in the case of smoking behaviour. More detailed analyses showed that the change in smoking behaviour could be observed among blue-collar workers (both unskilled and skilled), while the reduction in weight applied only to white-collar workers (excluding managers and employees with 'cadre' status).
On the basis of the study carried out in Austria, which examined the effects of a working time reduction from 38.5 to 30 hours with wage compensation in a small company using two cross-sectional surveys one (n = 24) and four (n = 27) years after the changeover in a design based on retrospective assessments, Arlinghaus et al. (2024) were also able to show positive effects on employees' job satisfaction, work-life balance and health. However, the analyses also show that the mean values in the second wave are lower on average than in the first wave, although most of the differences in mean values are not statistically significant, presumably because of the small number of cases. Thus the mean value for the question "In your view, what has been the effect of the working time reduction or the 30-hour week?" falls from 4.21 to 3.73 (scale from 1 ("significantly worse than before") to 5 ("significantly better than before") (Arlinghaus et al. 2024, p. 72). Statistically speaking, the difference remains insignificant, such that the employees' assessments are stable and remain

positive. In our view, however, because of the small number of cases and the fact that these are retrospective assessments, the results require further validation.

A study from China (Hu et al. 2024) investigated the effects that a legally mandated working time reduction in 1995 had on state employees' health behaviours. In the wake of the reform, the working week of state employees (and only state employees) was reduced from 48 to 40 hours by removing Saturday as a working day; pay remained unchanged. A panel survey conducted in waves in 1991, 1993, 1997 and 2000 among employees aged between 20 and 60 was available for the analysis. The analyses show initially that the working hours of state employees fell by 5.8 hours per week compared with those in the private sector. In contrast to other studies, the authors were unable to identify any positive effects produced by the reduction in working time. On the contrary, the analyses, which were based on a difference-in-difference approach in which the health behaviours of state employees and white-collar employees outside the state service were compared while controlling for relevant company and individual characteristics, showed that for state employees the probability of being overweight rose by 4.8 percentage points, while the probability of having been ill in the past four weeks rose by 2.8 percentage points. The working time reduction even had a negative impact on alcohol consumption. After the reform, state employees were 7.6 percentage points more likely to drink frequently than employees in the private sector. Furthermore, the probability of state employees rating themselves as being in good health declined by 3.5 percentage points. The analyses also showed that the effects were generally more negative for men than for women, particularly with regard to alcohol consumption. All things considered, the authors conclude that a working time reduction does not always necessarily produce positive results. Unfortunately, the authors do not provide any further information on how the working time reduction was implemented at establishment level. Was some work simply not done? Were more staff hired to deal with the work that remained undone or did the reduction lead to an intensification of work, since the same volume of work now had to be done in five rather than six days? This latter possibility would cast the results obtained in a new light – in the absence of this information, caution must be exercised in interpreting the results.

In a systematic literature review from 2001 to 2019, Jansen-Preilowski et al. (2020) found 13 scholarly articles dealing with the effects of a working time reduction on 'work-home balance', recovery and health-promoting behaviour. Three of these studies looked at health-promoting behaviour in the form of physical activity and other active recovery activities, with two of them identifying positive effects produced by the working time reduction (von Thiele Schwarz et al. 2008; Schiller et al. 2018) and one finding no significant changes in health (Von Thiele Schwarz et al. 2015). The one study that falls in our investigation period and which meets the standard of a randomised controlled intervention

study will be briefly described here. The investigation by Schiller et al. (2018), which is based on self-reported daily time use and written surveys), analysed the effects of a 25% working time reduction with no change in pay on leisure behaviour over a period of 18 months and three measurement points in 2006/06; one intervention group with a working time reduction and one without were compared. The results showed that employees with reduced working hours engaged in physical and other recreational activities more frequently than those in the control group. The increase was observed between the first two measurement points and did not undergo any further change in the following nine months but remained constant at the level achieved earlier. The results obtained regardless of gender and the presence of children in the household. Another study conducted in Sweden (Barck-Holst et al. 2021 among social workers (n = 28) who reduced their working time by 25% while retaining the same pay, showed significant improvements in terms of stress and emotional exhaustion but not for the two other sub-scales of the burn-out scale,[6] 'depersonalisation' and 'personal accomplishment'. Since the employees' working time reduction was not accompanied by a reduction in the volume of work, the authors conclude that a reduction in working time alone can also produce positive effects (depending on the conditions in the occupation in question). The organisation of time outside of work had also changed, which also contribute to the reduction in stress:

> In contrast, reduced working hours altered contextual conditions off-work by reducing time-conflict and increasing recovery opportunities, with drastic reductions in stress. The increase in off-work recovery also seemed to reduce work stress. (Barck-Holst et al. 2021, p. 106)

Against this background, it is not surprising that the majority of participants in the British pilot study (see above) also reported improvements in their own mental health (43%, deterioration: 16%). Furthermore, many respondents also noted a reduction in feelings of anxiety[7] and negative emotions (54 %) (Frey 2023, p. 20). Results from Japan confirm the assumption that reducing full-timers' working hours contributes significantly to improvements in mental health. In 2010, legislation was passed in Japan that made the extensive use of overtime more expensive by doubling the overtime premium from the 60th hour of overtime worked in any one month; as a result, many companies reduced their use of overtime, thereby reducing the actual number of hours worked. Drawing on an annual longitudinal survey (2009 to 2013, n = 4341) conducted as part of the *Japan Household Panel Survey on Consumer Preferences and Satisfaction*, Kohara and Noda (2023), using a difference-in-differences analysis of male full-time employees with fixed-effects instrumental variables and controlling for

[6] The author used the Maslach Burnout Inventory – Human Services Survey (MBI-HSS), which consists of 22 items and three sub-scales.

[7] Anxiety was measured on a four-point scale from one ('never') to four ('every day) and decreased slightly during the investigation period from 2.26 to 1.96 (Frey 2023, p. 20).

individual and company characteristics, found that as a result of the working time reform the average weekly working time for full-timers fell by 2.66 hours, which in turn had a positive effect on respondents' mental health.[8]

CONCLUSION

The vast majority of studies on the effects of working time reductions on mental and physical health and health-promoting behaviour report positive effects. This finding is also shared by one of the academic experts we interviewed:

> These were not necessarily four-day week studies, but mostly just reductions in working time in general that took various forms. But across the board it's absolutely the case that most of the studies found improvements. Particularly with regard to feelings of stress, anxiety or depressive states and so on (…). (Researcher 1)

However, there are also indications that these positive effects do not always occur automatically whenever working time is reduced. Thus, the study by Hu et al. (2024) shows that working time reductions had a negative effect on men's alcohol consumption. In the UK pilot study as well, it was regularly observed that a (smaller) share of participants reported either no or even negative effects (Lewis et al. 2023). Moreover, in an Austrian study that investigated the effects of a company-level working time reduction on health and other aspects, the retrospective survey data can be interpreted as indicating that a fatigue effect cannot be ruled out with regard to positive effects on health. In our view, there is a need for further research in this area.

For various reasons, the studies provide few indications as to the general conditions that might contribute to the improvement, maintenance or even deterioration of health in a four-day working week. For example, the UK pilot study does not provide any information on which groups of respondents the employees who reported positive or negative effects belong to. There are no analyses by gender, life phase or – perhaps even more importantly – by the precise individual type of working time reduction that was implemented. The study by Hu et al. (2024) also provides no information on the implementation of the working time reduction or on whether the reduction was accompanied by a reduction in the volume of work. It is conceivable that a working time reduction without a corresponding change in the volume of work or work organisation might lead to a deterioration in health or healthy behaviours. On the other hand, Schiller et al. (2018), for example, were unable to find any differences between the various groups with regard to the positive effects of a 25% reduction in working time depending on gender, family status and job situation. It therefore remains largely unclear which (groups of) employees might particularly benefit from the

[8] Measured using five items that were combined to produce a single score ("have anxiety about my health", "have been feeling stressed lately", "have been feeling depressed lately", "have not been sleeping well lately", "have been feeling lonely lately" (Kohara and Noda, 2023, p. 644).

introduction of a four-day week. This gap is conspicuous insofar as differences would be expected depending on the employees' area of activity:

> (…), I think that depends very much on the pressures of the job itself, that is what people actually do. We see that a great deal still with shift workers, for example, who already experience a higher level of stress due to their displaced working hours, for example due to night work and working regularly at weekends, if you think about permanent shift work. And for some time now, there has been a drive towards schedules that have significantly shorter weekly working times, closer to 35 hours per week. This allows you to create much more ergonomically favourable shift schedules than with 40 hours, for example. […] For jobs that are less stressful, I don't really see any reason why we should cut back to 30 hours from a health point of view. Those employees can actually manage quite well working full-time. We don't currently see any very high risks there normally. (Researcher 1)

In the view of the trade union representative we interviewed, reduced working hours can at least be an effective 'building block', albeit not a panacea, especially in sectors affected by health problems and staff shortages:

> Well, I think that's a really difficult issue, because the employers are promoting the exact opposite. They're saying, we all have to work longer hours in order to resolve the skills shortage. And basically, we're saying the exact opposite. You have to make working life less stressful so that people have the possibility to work more and so that people have the possibility to work longer. (trade unionist)

2.2. FAMILY AND RECONCILABILITY

If weekly working time falls following the introduction of arrangements such as the four-day week, the question arises as to the effects this has on families' internal organisation and hence the exercise and division of paid work and (unpaid) care work. For example, do certain working time reduction models offer an opportunity for the renegotiation and redistribution of paid and care work, contrary to traditional gender stereotypes? What preconditions must such a model fulfil, taking into account various needs, in order for care work to be distributed within the traditional nuclear family in a more egalitarian and gender-equitable way? And what effects might various working time reduction models have on families other than the traditional nuclear family, such as those headed by a single parent?

In both academic and public debates, models of working time reduction such as the four-day week are generally seen as having great potential for improving the reconcilability of family and paid work. This potential ranges from the organisation of everyday life, at one end, to the possibility of redistributing care and paid work between the sexes, at the other. However, these positive assumptions come up against the very limited empirical data that is available, which also has little to tell

us about the medium- to long-term consequences. In the meta-study by Hanbury et al. (2023), the authors identify five studies[9] that investigated the effects of working time reduction measures on work-family reconciliation conflicts. In general, the studies conclude that work-life balance conflicts decreased and that reducing working hours to a greater extent further intensified the effect (Hanbury et al. 2023). The comprehensive literature study by Jansen-Preilowski et al. (2020), which investigated the effects of a working time reduction on what they call the work-home balance in the investigation period between 2001 and 2019, concluded that the working time reduction led to more time for social activities and for friends and family, which in turn had a positive effect on reconcilability and the time available for household tasks. One of the studies cited by Jansen-Preilowski et al. (2020) falls into our observation period and was already mentioned in the previous section (Barck-Holst et al. 2021). In this study, the interviewees reported that the 25% working time reduction had enabled them to resolve existing time conflicts. As a result, they perceived the free time as triggering less stress and had more time for friends, family, care work, sports and recreation. The aforementioned Austrian study by Arlinghaus et al. (2024) found positive effects of a company-level working time reduction on employees' retrospective assessments of their work-life balance. The effects were reported in surveys conducted one year and four years after the switch from a 38.5- to a 30-hour week.

The results of other studies indicate, in contrast, that a working time reduction in the form of a shorter working week might, under certain circumstances, actually rigidify or even intensify work-life balance problems within families. Thus Lewis et al. (2023) observed only limited effects on the household division of labour following the introduction of a four-day week. Although fathers did indeed increase the time they devoted to childcare more than women did, very little if any change in the time men spent on other household tasks could be observed(Frey 2023, p. 23). One reason for the relative rigidity of differences in behaviour may lie in the form taken by the reduction in working time. As already explained above, the majority of the companies in this study opted to introduce an additional day off, which suggests that working time on the other days remained unchanged – which is why it can also be assumed that the family division of labour on these days unaffected by changes in working hours remained more or less unchanged.[10] This assumption is supported by a somewhat older study of the effects of a working time reform in France, in which Fagnani and Letablier (2004) concluded that an even distribution of the reduced

[9] It should be noted that three of the studies cited by Hanbury et al. no longer fall within our observation period and that two further studies investigated the effects of an individual working time reduction without wage compensation.

[10] In the study, the working time reduction was implemented in various ways in the companies investigated; the possible effects of these different modes of implementation were not taken into account in the analyses (Lewis et al. 2023, Frey 2023).

hours over the week can be expected to produce greater improvements in work-life balance than other forms of working time reduction. Lepinteur (2018), who also refers to the working time reform in France as well as to that in Portugal, uses data from the *European Community Household Panels* and a difference-in-differences approach to show that the reduction in working time led to a significant increase in job satisfaction. This increase was attributed to increased satisfaction with working time and working conditions. The study also showed that the employees affected by the reform reported greater satisfaction with their free time.

Similar results were obtained in an Icelandic study commissioned by the Icelandic government and Reykjavik City Council that was based on a sample of 2,500 employees in 66 companies and institutions. Although often cited as a four-day week, the reduction in weekly working time was in fact just one to three hours (Haraldsson and Kellam 2021). One of the key findings was the positive effect on the reconcilability of family life and paid work, with a majority of respondents declaring that their quality of life had improved as a result and that they had more time to spend with their families and their partners (Haraldsson und Kellam 2021). One reason for this was that housework that would otherwise be done at the weekend could be completed during the working week (Haraldsson and Kellam 2021). This was also reflected in the (re)distribution of housework, with men in heterosexual relationships stating that their contributions to housework had increased as a result of the reduction in working time - an assessment that was, however, put into perspective by female respondents (Haraldsson and Kellam 2021). A Belgian study investigated the transition from a 36- to a 30-hour week among full-time employees who, with just one exception, were all female. Data were collected in four waves (two before the changeover and two during it) and use was also made of interviews and a diary study (n = 61). It was concluded that the additional time gained as a result of the working time reduction was used by the almost exclusively female respondents for housework, care work and self-care – although this had not been the employees' original intention (Mullens et al. 2021). The same study also investigated the preferences expressed by women who, when a reduction in weekly working time to 30 hours was being enacted, were given a choice between 4 x 7.5-hour days or 5 x 6-hour days. Around 80 % of respondents opted for the first variant. A majority of respondents preferred a four-day week with a daily working time of 7.5 hours over a 5-day week with a daily working time of 6 hours (Mullens and Glorieux 2024). This result initially appears to contradict the assumptions of Fagnani and Letablier (2004). However, further analyses showed that the day of the week off chosen by mothers in particular fell disproportionately often on a Wednesday, a day on which schools in Belgium traditionally finish earlier than usual (Mullens et al. 2021). Clearly then, the contextual conditions, which may vary nationally or regionally, must be taken into account in each case.

*Conclusion*Models such as the four-day week are seen as a way of improving the reconcilability of paid work and private responsibilities, on the one hand, and facilitating a redistribution of paid work and unpaid cared work between the sexes, on the other (Chung 2022). However, it must be noted that current studies that focus on these aspects, while informative, are few and far between. This assessment is also shared by the academic experts we interviewed. In the three expert interviews, the potential of a rigid four-day week for helping to reconcile the demands of paid work and family life is assessed rather negatively compared with the potential of alternative forms of working time reduction:

> So, when I have to pick the children up from nursery, there's no way around the fact that I have to leave the office by half past four at the latest because the nursery closes. And if I then have to work until half past five, that presents me with problems. And in that respect, I think these are all things where you really have to look at the different realities of employees' lives and find flexible solutions in companies if a four-day week is introduced. […] So that things don't start going backwards as far as work-life balance is concerned. So, the gender perspective is important here. But I think that a life course perspective is important as well, because there are of course situations in which employees have different working time needs at different stages of their lives. (trade unionist)

> (…) and if you look at this in terms of work-life balance or even in terms of family policy, then it's more important for picking up and dropping off children, for after-school care, that this is also done every day when working hours are reduced. That would then perhaps be more the six-hour day, which is also a model that is often discussed or debated […], of course more in terms of work-life balance, but also in respect of recreation time, travel times of course, it has many advantages. (researcher 2)

> So, from my point of view, it's no help at all in that respect, for example, to have four long days. Then you have one day off, but I mean, do you take the child out of care completely on that day? Or do you pick them up earlier? So, for me, that's not automatically a great work-life balance when you think about childcare, for example. (researcher 1)

According to our analyses, a working time reduction can certainly improve the work-life balance, particularly but not solely for individuals with care responsibilities, i.e. women above all. Both working time reductions and flexibility in the organisation of working hours are key requirements in working time models in order to reconcile the demands of paid life and family life. However, as is also evident from the studies, a reduction in working time does not automatically lead to a redistribution of work; on the contrary, women and men seem to use the time gained differently and also to perceive this use of time differently. These findings confirm results from research into working time flexibility. For example, Lott (2019) was able to show that men and women used the time gained from working at home and working time sovereignty instruments differently. Men used the

additional time primarily for their professional development, while women spent more time on work, children and the household (cf. Kümmerling et al. 2025 on subjective perceptions of the division of labour within couples). Nevertheless, the four-day week model or general working time reductions may contain the potential for a gradual change in gender norms and corresponding arrangements, as this quotation from an academic expert makes clear:

> I see the reduction in working time to these six hours as a transition to the dual care model, in which both partners have the opportunity to combine recreation and family work as well as further education or training, that is while also working full-time. (researcher 2)

2.3. EFFECTS ON LIFE, EMPLOYMENT AND CAREER TRAJECTORIES

There is currently no empirical research that deals with the long-term effects of a four-day week on career and employment trajectories. This is due mainly to the fact that the few longitudinal studies that can be found on the effects of a systemic working time reduction usually cover short periods of time (as was the case with the UK pilot study and the Swedish studies) or have a different, in some cases rather selective focus, in which they look only at employees who were in continuous employment during the investigation period and, in some cases, with the same employer. Thus it remains an open question whether and in what way a reduction in working time impacts life, employment and career trajectories.
Hanbury et al. (2023), in their comprehensive literature analysis, were unable to find any study that investigated the effects of an organisational or company working time reduction on individual employment or career trajectories. Drawing on a fairly recent (Fernandez-Kranz and Rodriguez-Planas 2021) and two older studies that included individual working time reductions (Connolly and Gregory 2008; Dex and Bukodi 2012), they conclude that women's career success is negatively influenced by a reduction in working time, at least "in the absence of other support mechanisms or broader societal changes" (Hanbury et al. 2023, S. 7). However, the studies were not concerned with newer working time models as we understand them, but rather with the effects of standard part-time work. "None of the included studies reported on the extent of the WTRs, comprised a WTR policy at the organizational level, or referred to any form of wage compensation, precluding conclusions regarding these conceptual elements" (Hanbury et al. 2023, p. 7).

CONCLUSION

Chung (2022) sees the changeover to a shorter working week as an opportunity to limit existing inequalities. In a society in which paid work and unpaid (care) work are distributed according to gender, long working hours reflect a masculinised work culture and make it difficult for women, and especially those

with children, to participate equally in the labour market. A reduction in working time (across society as a whole) could break down the existing inequalities and lead to a redistribution of paid and care work. However, as has already been shown above, it is not to be expected that a reduction in paid working time would automatically give rise to such a redistribution. Unpaid (care) work will not be automatically redistributed because it is subject to overly strong gender-stereotypical role allocations. Examples of the pulling power of normative gender roles can be found again and again in the world of work, for example when gender-neutral instruments that can facilitate reconcilability are interpreted in a gender-specific way (see the study by Lott (2019) on the gender-specific use of flexible working time and home working and Haarmann et al. (2025) on the use of life phase-related working time flexibility). If this is applied to the possibility of working time reduction, it can be assumed that a voluntary offer of reduced working time without wage compensation (as already exists with bridging part-time work and the right to part-time work) might simply perpetuate existing gender relations because it would be more likely to be taken up by women. In order to achieved gender equality in the distribution of care and paid work, what is needed is no less and no more than a new social paradigm,[11] for which an alternative working time model with shorter working hours might be the first step but which must be supported by further measures. These include measures that are often mentioned and have become very familiar in this connection, such as the further expansion of nursery provision and after-school care for primary school children – the reliability and quality of the care must also be improved. The same applies to residential and domiciliary care provision for the elderly. A reform of the parental allowance with an extension of the so-called paternity months (Jansen and Kümmerling 2025) and the abolition of the marital 'splitting' system, which provides for married couples to be taxed jointly, are further supporting measures on the way to a more equal society.

Under what conditions can a working time reduction be expected to have negative effects on employees' employment or life trajectories? Negative impacts on individual employment histories or career development are to be expected above all if the four-day week is not introduced on an organisation- or sector-wide basis but is chosen only by isolated individuals or specific groups of employees[12] (parents, people with health problems or with disabilities) because of the life phase they find themselves in.

> And that is precisely how employers respond to flexible working times or care work. What is the norm in society? If the question of a year's

[11] In this context, the "Optionszeitenmodell (time option model devised by Jurczyk and Mückenberger (2020) is worthy of mention by way of example, since it aims to achieve the goal of redistributing care and paid work not by a general reduction in weekly working time (see also Klammer 2023) but rather by establishing so-called atmende "breathing" life courses, that enable male and female employees alike to prioritise care work, self-care or further training for a fixed period of time,"Atmende Lebensläufe" (breathing life courses) are thus to be established as the new normality.

[12] Under these circumstances, it would probably be difficult to justify maintaining existing wage levels.

> parental leave for fathers is a problem, they you can see that it's due to societal values and norms as well as to the power relationship between employees and employers. Individuals may want it, but they may be afraid it will be detrimental to their careers. (researcher 1)

Negative consequences for employees and possibly also for their future employment trajectories are also to be expected if the working time reduction is not accompanied by a corresponding reorganisation of the company's work processes or new appointments to compensate for the lost working time, meaning that the additional free time is being gained primarily through work intensification – as was the case in the Swedish example (Barck-Holst 2021; de Spiegelaere and Piasna 2017). Although the study showed positive effects on health and work-life balance that could be attributed to the increased free time, the workload was still perceived as high. It would be desirable to have longer-term studies that show how sustainable the positive effects of a working time reduction might be under these circumstances. It can reasonably be assumed that these effects also depend to a large extent on the design of the reduction, who has access to it in the first place and the extent to which it meets the very different needs of the various employee groups. It is precisely here that discriminatory factors such as gender, age, type of job, parenthood, income, physical and mental disabilities and impairments come into play.

Working time reduction models in which working hours are distributed flexibly, e.g. over five days of the week, so that they meet employees' needs, might particularly benefit those whose jobs involve physical work, particularly shift workers, and who until now have been able to make less or no use at all of flexible working time arrangements, such as working from home.

> Yes, absolutely. So, it is precisely those groups of employees who are already burdened by their work or by their working time, as I've already said shift work is one example, but also employees who carry out very physically or mentally stressful activities, I think they're the ones who can benefit most from the reduction […]. I think these are certainly occupational groups that would ultimately get more money for what they already do with reduced working hours. (researcher 1)

3 Subjective health assessments as a function of working days and working time. A quantitative approximation based on the SOEP.

The effects of a four-day week on employees' health have not yet been conclusively researched, as this review makes clear. In particular, there is a lack of quantitative empirical studies with generalisable results. In this section, we will attempt to address this issue using our own calculations based on data from the German Socio-Economic Panel (SOEP). It will be assumed, on the basis of the current state of research, that a change from a full-time five-day week to a four-day week with reduced working time has positive effects on employees' subjective health, while a change to a compressed working week is more likely to be associated with negative health consequences.

Hypothesis 1: Four-day week with reduced working time
H1: When employees shift from a five-day week with 31 to 40 hours' work to a four-day week with 25 to 32 hours' work, their subjective health assessment improves.

Hypothesis 2: Compressed working week
H2: When employees change from a five-day week with 31 to 40 hours' work to a four day week with 33 and more hours' work their subjective health assessment deteriorates.

3.1. DATA AND METHODOLOGY

The German Socio-Economic Panel offers several advantages over other datasets, in particular the length of its core coverage and its multidisciplinary orientation. It is a panel survey that has been conducted annually since 1984 with currently some 30,000 respondents in around 15,000 households, from whom

data is gathered on various areas of life, such as income, employment, education, health and quality of life.

The waves from 2015 to 2021 were used for the following analysis. The analysis sample comprised dependent employees aged between 18 and 64; self-employed workers, trainees and marginally employed individuals ("mini-jobbers") were excluded because of their atypical working and employment conditions. After the exclusion of respondents for whom some data was missing and those who had fewer than two observations, the analysis sample comprised a total of 15,744 individuals and 66,059 person-years over the seven points in time (2015 to 2021). In order to rule out the possibility that the correlation between the subjective state of health and a change in working days and working time was attributable to a change of job and the associated change in the wider work context, the analyses were also carried out for the subsample of all employees who had not changed their job in the analysis period. For this subsample, information was available for 11,053 individuals and 53,723 person-years.

The dependent variable in the analyses captures respondents' subjective health and is based on the question: "How would you describe your current health?" In preparing the data for analysis, the responses were divided into five categories, ranging from "bad" (1) to "very good" (5).

The central independent variable, consisting of working days and working time, was generated from two items: (1) "How many days do you usually work per week?" and (2) "How many hours per week is your contractual working time excluding overtime?". The resulting combined variable contains the following categories: 'fewer than four days'; 'four-day week with 24 hours or less'; 'four-day week with 25 to 32 hours'; 'four-day week with 33 hours or more'; 'five-day week with 30 hours or less'; 'five-day week with 31 to 40 hours', 'five-day week with 41 hours or more' and 'more than five days'. The 'five-day week with 31 to 40 hours' is used in the analyses as the currently prevailing full-time norm and hence as the reference category.

In addition, control variables were taken into account, including the change in age as a metric variable, marital status, which indicates whether there was a change from a different living arrangement to marriage and cohabitation during the observation period, a variable indicating changes in care responsibilities for children under the age of 16 and the change in the logarithm of the (imputed) gross earned income. Over and above this, so-called period effects were integrated into the models by including year dummies. Their coefficients are not shown in the presentations because they are of little relevance to the interpretation of the content. The values and codings of the variables can be found in Table 1.

The panel structure of the SOEP data makes it possible to apply methods used to analyse longitudinal data. The significant Hausman Test and content-related

considerations support the choice of a fixed-effects model. By subtracting the unit-specific mean values, this method allows better control of unobserved heterogeneity than methods applied to cross-sectional datasets, such as the frequently used linear ordinary least squares regression. Time-invariant variables, such as gender for example, do not have to be explicitly specified in a fixed-effects regression but are nevertheless controlled for.[13] Panel-robust standard errors were used for all models.

3.2. RESULTS

Table 1 shows the relationship between the change in the working time model (in various combinations of working days and working time) and employees' subjective health, with changes in the control variables also being taken into account. The low R-squared value indicates that the explanatory variables can explain only a small part of the variation in subjective health. This can be explained in part by the choice of method, which uses only intra-individual (within-person) variation.

The signs of the coefficients in the model for all employees (M1) follow the pattern expected in the hypotheses: the assessment of health improves among those employees who changed from a (nearly full-time) five-day week (with 31 to 40 hours' work) to a four-day week with reduced working time (with 25 to 32 hours' work). On the other hand, among employees who switched from a (nearly full-time) five-day week to a compressed four-day week (four-day week with 33 hours' work or more) the assessment of their health tends to deteriorate. However, these correlations in Model 1 are not statistically significant. Whether employees switch from a (nearly full-time) five-day week to a four-day week with reduced working time (H1) or to a compressed four-day week (H2) has no effect on their subjective health that can be generalised to the population as a whole. Thus, hypotheses H1 and H2 must be rejected due to a lack of significance. Since fixed-effects estimators are regarded as particularly conservative due to their methodology, the recognisable patterns do, nevertheless, provide a starting point for further investigation in future research.

3.3. ROBUSTNESS CHECKS

In order to examine the results further, two subgroup analyses were carried out. In order to exclude the possibility that the pattern found was due to a job change and, as a result, to further changes in the employees' working conditions, the first analysis was carried out only for employees who did not change jobs during the analysis period (see Model 2) The coefficients of interest in this first sub-group

[13] On the method, see Allison (2009).

analysis are similar in direction, size of effect and significance to those used in the analysis of the entire sample and thus confirm the patterns. Secondly, since working a four-day week is being discussed against the background of employees' care responsibilities, an interaction between the variables on the duration and scheduling of working time and that on the presence in the household of children under 16 was estimated in the model for the total sample (results available from the authors on request). The interaction terms of interest in this analysis are not significant. Thus, there is no significant difference between employees with and those without children when they switch from a nearly full-time five-day week to a shortened or condensed four-day week.

In addition to these subgroup analyses, further models were estimated, including a random effects regression, which showed similar patterns to the FE model. A marginal significantly better assessment of health emerged from the model for all employees when switching to a four-day week with reduced working time. Alternative categorisations of the variables on working time and working days did not result in any substantial differences in the patterns either.

Table 1 : Subjective health (1= bad to 5= very good) and working days/working time; total and for employees without job changes, fixed-effects regression for the years 2015 to 2021.

	M1 Total		**M2 Without job change**	
Working days and working hours (change from ref. to ...)				
Less than four days	0.027		0.027	
	(0.026)		(0.033)	
Four-day week with 24 hours or less	-0.003		0.013	
	(0.027)		(0.033)	
Four-day week with 25 to 32 hours	0.019		0.022	
	(0.024)		(0.029)	
Four-day week with 33 hours and more	-0.022		-0.019	
	(0.037)		(0.043)	
Five-day week with 30 hours and less	0.014		0.022	
	(0.016)		(0.020)	
Five-day week with 31 to 40 hours (Ref.)				
	.		.	
Five-day week with 41 hours and more	0.024		0.045	+
	(0.020)		(0.023)	
More than five days	0.005		0.010	
	(0.017)		(0.020)	
Age (per year)	-0.034	***	-0.026	*
	(0.010)		(0.012)	
Marital status	-0.047	*	-0.054	*
(Dummy: 0= other; 1= married and living together)	(0.019)		(0.023)	
Children up to 16 years in hh	-0.046	**	-0.049	**
(Dummy: 0= no; 1= yes)	(0.015)		(0.017)	
Log. Gross earned income	0,043	***	0,080	***
	(0.010)		(0.015)	
Constant	4,.76	***	4.232	***
	(0.489)		(0.573)	
Observations	66059		53723	
R-squared	0.003		0.004	
Adjusted R-squared	0.003		0.004	

Note: Data basis: SOEP V38 2021; own calculations. + Statistically significant at the .10 level; * at the .05 level; ** at the .01 level; * at the .001 level. Fixed effects regression (FE). (Panel-robust) standard errors under the coefficients in parentheses. The dependent variable is subjective health.**

3.4. LIMITATIONS

One of the limitations that should be noted is that, even with a fixed-effects model, relevant time-varying third variables may remain unconsidered. Furthermore, the problems of reverse causality cannot be completely ruled out, although it can be better captured than with pure cross-sectional models. However, it is conceivable that employees may opt for a four-day week or a reduction in working time because of an already existing or emerging improvement or deterioration in their state of health. A further limitation can be seen in the relatively short observation period. On average, information is available for 4.2 years per individual. Accordingly, a longer observation period would be necessary in order to capture longer-term effects on subjective health. Furthermore, it would be desirable for future, more extensive analyses based on the SOEP to take into account by approximation the wage changes, i.e. the at least partial wage compensation, in combination with the working days and working time. To this end, appropriate questions should be included in secondary studies or targeted survey studies carried out.

3.5. CONCLUSION

The analysis cannot confirm any significant changes in employees' subjective state of health when they switch from a (nearly full-time) five-day week to a four-day week with reduced (H1) or compressed (H2) working time. This applies both to employees with and to those without children in the household. In view of the fact that the fixed-effects estimators are considered conservative and therefore have an increased probability of Type II errors, it can nevertheless be stated that the models reveal patterns that are consistent with the formulated hypotheses, regardless of statistical significance.

4 Conclusion and gaps in the research

The hype surrounding the four-day week, particularly in the wake of the widely publicised results of the country-specific pilot studies, has (so far) sparked little research activity – many of the more recent publications draw on old data and systematisations of the existing literature, however meagre that literature may be. In our view, one fundamental problem is that there is no real theory on the effects (of the various models) of working time reduction. Many assumptions are derived from the empirical findings of research on working time flexibility or long working hours or originate in psychology and are therefore focused primarily on individual factors and consequently fail to take into account contextual influencing factors such as life phase, sector and working time model. The lack of general assumptions about the effect of certain working time reduction models probably also means that studies that could actually make this distinction (Lewis et al. 2023) do not disaggregate their results to that effect.

Another phenomenon that is often not critically scrutinised in the research is the fact that, in the vast majority of reported cases, the actual reduction in working time fell significantly short of the cut initially promulgated. This could of course be interpreted as indicating that any cut in working time clearly has positive effects. However, there is another obvious interpretation: even with longer lead times, it is not possible to organise work in such a way as to realise the 100-80-100 model (100% performance, 80% working time, 100% pay) promised by defenders of the four-day week. So, is the goal of the four-day week an empty promise? Only more and better systematised research can give the lie to this notion.

Firstly, a research programme would have to evaluate the effects of various four-day week models (shorter daily working hours, a “genuine” four-day week taking into account the scheduling of the additional day off) – and to do so if possible, by means of repeated surveys conducted over a longer period of time in order to be able to identify any possible fatigue effects of the new working time system or delayed long-term positive effects. The investigations should be concerned not only with job quality but also with aspects of physical and mental health. Future research could also increasingly take objective indicators of health into account, in order not to be dependent solely on self-reported experiences.

The existing studies show that very little is known about the longevity of the effects described. How sustainable, for example, is the reduction in perceived stress or the positive assessment of work-life balance once the “honeymoon phase” of shorter working time is over? Does a work organisation model that has been slimmed down in the interests of efficiency not require constant evaluation so that time sinks can continue to be identified? And for how long can employees maintain a strictly efficient modus operandi without the possibility of taking micro-breaks or having informal conversations?

According to the proponents of a new standard working time, it should also be assumed - and researched accordingly – that shorter working times can have positive effects not only on employees but also on social security systems (especially old-age and health insurance). If shorter working times are positively related to health and work-life balance, it is to be expected that this will in the long term be reflected in fewer days of absence and/or increased capacity for work, as well as longer working lives. This will require, secondly, **long-term panel studies** that will evaluate the effects of the various models of the four-day week – in order to be able, for example, to reveal possible fatigue effects or delayed positive effects (such as later onset of stress-related illnesses). The investigations should be concerned equally with job quality and aspects of physical and mental health.

It is also unclear to what extent the widespread introduction of shorter working times - particularly with full wage compensation and in the form of a shorter working week rather than a shorter working day – will lead to a redistribution of (unpaid) care work and hence to an increase in women’s employment. Future research should, therefore, investigate not only individual employees but also the effects on the family environment, with, among other things, the proportion of time spent on unpaid work being captured in a pretest/post-test design.

There are now several collective agreements governing the changeover to a four-day week. A ver.di collective agreement, for example, provides for a reduction in shift workers’ working time from 37.5 hours (in what was previously a five-day week) to 36 hours, with a 9-hour working day. It is to be expected that further agreements will be concluded within this framework; consequently, **monitoring the implementation and consequences of these collective agreements** will constitute a further productive field for academic researchers.

In order to achieve an improvement in health and the redistribution of care work by introducing a four-day week, further basic conditions must be put in place. Particularly when a (collective) working time reduction is introduced, it is important to maintain the criteria for good work and to continuously monitor compliance with them. And in order to make the equalising effect of the working time reduction on the gender distribution of paid and unpaid work a reality, supporting social policy measures must be implemented; these should be focused on the general

conditions for the provision of family and elder care, such as the expansion of childcare in nurseries and the improvement of afternoon care for primary school children, as well as a (qualitative) expansion of elder care.

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