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ORIGINAL RESEARCH

Inequality in Employment Trajectories and their Consequences for Perceived Employment Insecurity and Work Satisfaction During the COVID-19 Pandemic

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Abstract
This paper evaluates inequalities in employment trajectories during the first phase of the COVID-19 pandemic in Germany and their association with changes in perceived employment insecurity and work satisfaction in the short- and longer term. We contribute to existing research on employment changes and their effects during the pandemic in two ways. First, we not only focus on changes in the employment situation – remote work, short-time work, and furlough – but also consider the duration and volatility of these states by applying sequence analysis to high-frequency weekly data starting at the first lockdown. Second, we link these trajectories to changes in perceived employment insecurity and work satisfaction comparing pre-pandemic levels with those in summer 2020 and summer 2021 using change-scores. Data basis is the German Internet Panel (GIP) which provides bi-monthly panel data since 2012 and a special COVID-19 survey conducted weekly among the same respondents between March 20 and June 25, 2020 ('Mannheim Corona Study'). Our results show social gradients in the employment risks and their volatility, which are partly mirrored in the consequences for perceived employment insecurity and work satisfaction. A general rise in perceived employment insecurity is observed in the short term, particularly among previous short-time workers. In the longer term, negative consequences are more evident in work satisfaction, especially among individuals who initially experienced continuous short-time work. Our results provide evidence on the scarring of short-time work and highlight the importance of analysing the dynamics of employment trajectories instead of focussing on single transitions.

Keywords Germany · Job retention scheme · Employment security · Remote work · Sequence analysis · Well-being

Submission for the Special Issue: The impact of the COVID-19 effects on individuals' subjective well-being: medium- and long-term effects, heterogeneous consequences, related mechanisms, and variation by measurement.

Extended author information available on the last page of the article

1 Introduction

The COVID-19 pandemic and the containment measures had fundamental and immediate effects on economies and labour markets all over the world (Daly et al., 2020; OECD, 2020). The pandemic and the containment measures have introduced three main changes to individuals' working lives (Alon et al., 2020; Blundell et al., 2020; Möhring et al. 2020, 2023; Naumann et al., 2020; Verick et al., 2022), each of which potentially has consequences for employees' perceptions of their employment insecurity and satisfaction with work. First, many companies have experienced a loss of revenue and orders since the onset of the pandemic. The main job retention scheme to avoid mass lay-offs during economic crises in Germany is the short-time work arrangement, which allows companies to reduce their employees' working hours and wages in times of economic hardship or when production is impaired. In Germany, a quite generous government earnings replacement scheme then compensated the wage loss partially (Casey & Mayhew, 2023; Konle-Seidl, 2020). Second, the pandemic represents the largest homeworking experiment in history (Felstead & Reuschke, 2023; Kosteas et al., 2022) as many companies worldwide switched to remote working, also reducing inequality in the access to homeworking (Abendroth et al., 2022). Third, a widespread (but less regulated) response to the pandemic has been to suspend employees—so-called furlough (Blom & Möhring, 2021).

A lot of research investigates not only who is affected by these changes, but also which consequences they had for individuals' subjective well-being (SWB). For Germany alone, many studies have examined how working from home (WFH) and reductions in working hours are associated with (work-related) well-being outcomes, mostly focussing on the situation in the first year of the pandemic. For example, Zoch et al. (2022) show that short-time work is related to reductions and WFH to improvements in work satisfaction based on the National Educational Panel Study for May to June 2020. Möhring et al. (2021) examine the effect of WFH and short-time work on changes in work and family satisfaction in the first lockdown. In addition, many similar studies exist analysing the situation in other countries (e.g., Edler & Staub, 2023; Fan & Moen, 2023; Laß et al., 2023).

Our study goes beyond previous research in two ways. First, we take a sequence analysis approach to investigate social inequality in employment trajectories in the first phase of the COVID-19 pandemic relying on weekly survey data for Germany and the period March 20 to June 25, 2020. Thereby, we do not solely focus on employment status at a specific time-point or single job changes but consider the duration and volatility of the employment situation and visualize individuals' pathways in the early, disruptive phase of the pandemic. We assume that not only status changes, but rather the more long-term development, including the duration and repetition of adverse statuses, is crucial for their impact on individuals' work-related well-being. Second, we link these employment trajectories to changes in perceived employment insecurity and work satisfaction from the onset of the pandemic in the short-term, i.e. summer 2020, as well as in the longer term, i.e. summer 2021. For both time-points, we employ change scores to compare the values in summer 2020 and 2021 with their pre-pandemic levels. The data originate from the German Internet Panel (GIP), which is a representative longitudinal survey of the German population (Blom et al., 2015), as well as a special COVID-19 survey carried out as part of the GIP, the 'Mannheim Corona Study' (Blom et al., 2020).

The underlying research questions are, first, of a descriptive nature: *How do typical employment trajectories in the first phase of the pandemic look like and what inequality with respect to socio-demographic and pre-pandemic job characteristics exists in these trajectories?* Second, we turn to explaining the work-related well-being consequences of these employment trajectories and ask: *Are the employment trajectories in the early phase of the pandemic related to short- and/or more long-term changes in individuals' perceived employment insecurity and work satisfaction; how and for whom?* In the first step, we adopt a holistic perspective on employment trajectories and aim to identify patterns rather than examining specific employment states in an isolated way. Thus, this part is more exploratory and does not seek hypothesis-testing (Brzinsky-Fay, 2014).

The article is organised as follows. We first set out the theoretical background including a description of the government's crisis measures and related labour market inequality in Germany, and the relationship of employment situation changes and perceived employment insecurity and work satisfaction. We next describe the data, the operationalisation of variables, and the methods applied. We then present the results, first, of the sequence analysis of employment trajectories in the first phase of the pandemic, and second, on their relationship with employment insecurity and work satisfaction in summer 2020 and 2021 with change score regression models. Finally, we discuss our results and limitations, and present implications for further research.

2 Background

2.1 Labour Market Inequality and COVID-19 Crisis Policies in Germany

Germany has a coordinated market economy with labour market policies and regulations that have traditionally provided a high level of protection for employees, which created a high-wage and low-inequality economy during the post-war period (Bothfeld, 2007; DiPrete, 2005; Hall & Soskice, 2001). However, labour market inequality increased since the early 1990s due to an expanding low-wage sector and growing disparities between educational groups (Dustmann et al., 2009), and further intensified after the labour market reforms of the early 2000s, which included the flexibilization of the low-wage sector (Eichhorst & Marx, 2011). In addition to the educational divide, the German labour market features pronounced gender inequality as mostly women work part-time and the share of the female workforce in low-wage employment is one of the highest in Europe (Bosch & Weinkopf, 2008; Brülle et al., 2019; Eurostat 2021; Häusermann & Schwander, 2012). These pre-existing inequalities were mirrored in the design of the relief policies during the COVID-19 pandemic as well as its employment consequences.

The German federal government adopted several measures to lessen the employment effects of the COVID-19 pandemic. The general lockdown came into force on March 22, 2020. Quite immediately, the government took several actions to mitigate the negative effects of the pandemic and the containment measures including a public aid package with direct payments for companies that experienced revenue shortfalls (Federal Ministry for Economic Affairs and Climate Action, 2022). Furthermore, short-time work benefits were used extensively to allow firms to compensate closures and the loss in revenue. These benefits have a long-standing tradition in Germany successfully preventing mass lay-offs in

previous economic crises. They enable employers to reduce their employees' working hours without having to lay them off in the event of an economic downturn or temporary loss of orders (Gehrke & Hochmuth, 2021). Employers, rather than individual employees, apply for short-time work; working hours can be reduced flexibly and can even be set to zero. During the COVID-19 pandemic, the government prolonged the short-time work benefits to up to 24 months or the end of 2021 and enacted a temporary increase of the wage replacement from 60 to 70% (67 to 77% for those with children) of the net wage after four months and 80% (87% for those with children) after seven months (Federal Ministry of Labour and Social Affairs 2020). However, those in marginal part-time employment, who are typically not covered by social insurance, are not eligible for the short-time work benefit. Women are disproportionately affected by this, as they account for around 60% of all only marginally part-time employed workers (own calculations based on Federal Employment Agency Statistics, 2024a). Furthermore, sectoral differences existed the handling of short-time work during the pandemic: in the manufacturing sector, characterized by larger firms with greater experience in utilizing short-time work as a tool in crises, company bonuses topping-up the public benefits were more common, compared to smaller companies in the service sector which were less experienced in dealing with job retention schemes (Wiesner, 2020).

The second major change in working life in the context of the pandemic was the shift to working from home (WFH). Immediately after the start of the first lockdown, 26% of the workforce in Germany were WFH; by May 2020 almost one third of the workforce worked only or partly from home[1] (Blom & Möhring, 2021).While this first shift took place without governmental regulations of WFH, a legal obligation for employers to enable WFH, insofar as there are no operational reasons to the contrary, came into force on January 27, 2021. This obligation ended on June 30, 2021, and was reintroduced in November 2021 (Corona Datenplattform, 2021; German Federal Government 2021). Employees' ability to determine their own working time and location was most extensive among the highly qualified workforce in the internal segment of the service sector. Workers in low-skilled personal services as well as those in manufacturing often performed tasks that could not be done remotely (Adams-Prassl et al., 2020a; Felstead and Reuschke 2020). Furthermore, research on remote work before the pandemic highlighted gender differences: women generally had fewer opportunities to work from home even when it would be technically possible (Lott & Abendroth, 2020). Although the group of homeworkers is still selective, selectivity may have been reduced during the lockdown given that the containment measures were imposed with little or no notice. Early research on WFH during the pandemic suggests that the previous gender gap seems to have narrowed (Abendroth et al., 2022). However, there is also evidence that rather job characteristics than personal needs as impaired health or care responsibility played a role in the access to WFH (Hipp & Bünning, 2021; Möhring et al. 2020, 2023; Reifenscheid & Möhring, 2021).

Our analysis compares the reported employment insecurity and work satisfaction in June/July 2020 ('short-term') and July 2021 ('longer term') with the pre-pandemic values. We denote these two time-intervals as 'short-term' and 'longer term' referring to the onset of the pandemic. Figure 1 gives an overview of the course of the pandemic in Germany over the time-frame relevant to our study. The Stringency Index (Hale et al., 2021) indicates the strictness of containment measures based on nine potential measures, including workplace

[1] In 2019, 13% of the German workforce were at least occasionally WFH (German Federal Statistical Office 2023).

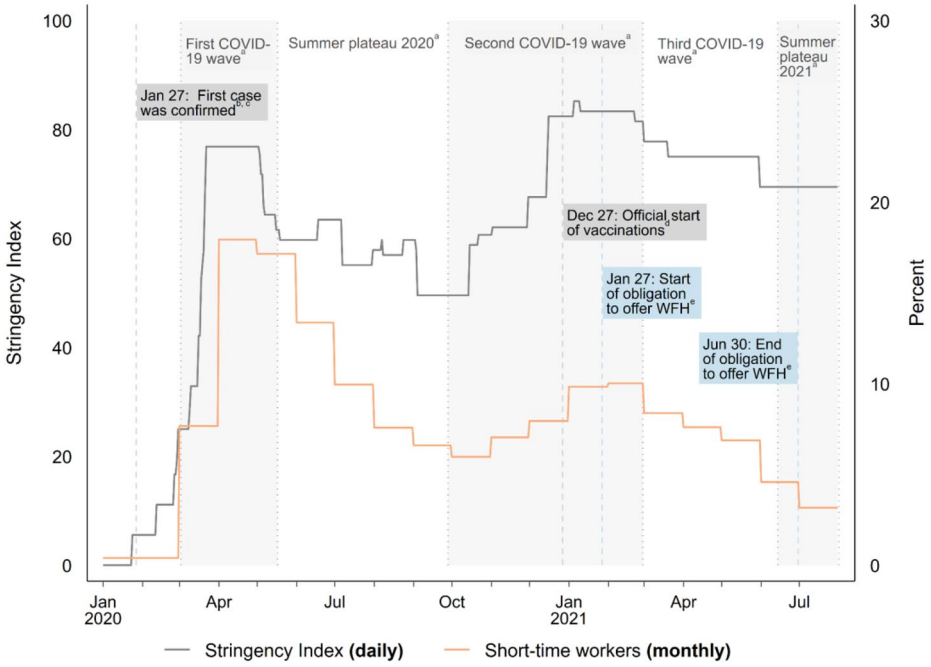

Fig. 1 Strictness of containment measures (left axis) and percentages of short-time workers (right axis) over the course of the pandemic in Germany. Figure by Möhring, K., Weiland, A. P., Reifenscheid, M., Steins, P. J., & Dreier, M., licensed under CC BY 4.0. https://doi.org/10.17605/OSF.IO/PJH2W. *Notes*: The Stringency Index ranges from 0-100 with higher values indicating stricter containment measures. The share of short-time workers equals the number of short-time workers divided by the number of all employees subject to social insurance contributions; WFH: working from home. *Source*: Stringency Index: Oxford COVID-19 Government Response Tracker (Hale et al., 2021); Short-time workers in percent: Federal Employment Agency Statistics, 2024b; [a] Tolksdorf et al., 2022; b Federal Ministry of Health, 2023; [c] Bundeswehr Institute of Microbiology, 2020; [d] Robert Koch Institute, 2020; [e] Corona Datenplattform, 2021

or school closings and stay-at-home-requirements. While the Stringency Index remained on a high level throughout the whole period, there are reasons to assume that consequences of changes in the employment situation may have diminished in the longer term. First, many of the pandemic-induced changes were normalized over the longer course of the pandemic. In January 2021, a law was enacted obliging employers to offer WFH which created a more long-term planning reliability for those WFH. Second, the vaccination campaign significantly expanded over spring and early summer 2021, fuelling hopes of an approaching end of the pandemic.

Due to the sudden introduction of containment measures in March 2020, jobs in the service sector that involve personal contact (restaurant and hospitality sector, retail, culture and entertainment sector, and household-related services) were suspended. Therefore, the pandemic hit employees in precarious service sector positions especially hard (Grabka et al., 2020). While manufacturing was not affected by the immediate shutdown, the implementation of containment measures in factories and the disruption of supply chains narrowed production capacities more in the long-term. It is likely that employees in the service sector, especially low-wage workers, experienced more immediate and more severe harm

compared to highly skilled service sector employees and those in the manufacturing sector. We therefore assume that employment trajectories and their volatility in the early stage of the pandemic are stratified along socio-demographic and pre-pandemic job characteristics, specifically gender, educational degree, income, and employment sector.

2.2 Consequences for Perceived Employment Insecurity and Work Satisfaction

To examine the effect of employment transitions during the early phase of the COVID-19 pandemic, we refer to two key components of work-related well-being, namely work satisfaction and perceived employment insecurity. The selection of these two indicators reflects the assumed impact of pandemic-related employment changes on individuals' well-being. First, pandemic-induced employment changes—as short-time work and furlough—are likely to be perceived as stressful because they induce feelings of insecurity about the future relevance or even existence of the own job; this might refer to the exact same job or similar jobs. Following Klug et al. (2024), we base these considerations on transactional stress theory (Lazarus & Folkman, 1984). Accordingly, changes in the employment situation are subjectively interpreted as organizational signals of economic difficulties and shrinking labour demand, as preludes of lay-off (see also, Edler & Staub, 2023). Similar to the negative effects of unemployment on SWB, the so-called scarring effect of unemployment (e.g., Clark et al., 2001; Knabe & Rätzel, 2011; Lucas et al., 2004), these changes may trigger fears of the future, thus, increase perceived employment insecurity.

Second, pandemic-related changes in the workplace have an impact on the daily work situation, i.e. they force people to change the scope, location and/or arrangement of their work, and therefore, might alter satisfaction with work in a positive or negative direction. This can be seen from the perspective of the conservation of resources theory (Hobfoll, 1989; Klug et al., 2024), according to which people's well-being is negatively affected when once-achieved resources or statuses are threatened. Transitions to short-time work or furlough are often associated with an income reduction or a potential cut in the future. For WFH, the association is less clear. On the one hand, employees experienced the loss of their physical office space and direct personal interaction with colleagues. On the other hand, they potentially gained new opportunities for work-life reconciliation. Particularly at the onset of the pandemic, the sudden shift to WFH might have been experienced more stressful, as it disrupted established routines and occurred at a time when remote work infrastructure—both organizationally and technologically—was not yet fully developed. In contrast, in the later phase of the pandemic—once remote work routines and infrastructures had stabilized—WFH may have evolved into a valuable resource for employees which could be jeopardised by return-to-office policies.

Not only single status changes, but the duration of experienced insecurities, meaning status persistence and volatility, are relevant for work-related well-being. This applies for both theoretical mechanisms described above: repeated or persisting episodes of insecurity can represent a chronic stressor (Glavin, 2015; Pearlin et al., 1981); repeated or persisting (perceived) losses or gains of resources may compound over time (Hobfoll & Lilly, 1993). However, as the situation in the early phase of the pandemic was erratic, we must view not only duration, but also volatility of statuses. Compared with the ability of people to adapt to a change in the long term, frequent status changes can lead to more uncertainty as they require repeated adaptation to resource losses.

We complement these theoretical considerations with empirical results from previous studies and draw upon pre-pandemic research looking at the effects of short-time work for (work-related) well-being as well as research on the consequences of pandemic-related employment changes. Previous research indicates that also short-time work can have a negative impact on work satisfaction and perceived employment insecurity. Based on data for Germany 2009–2018, Klug et al. (2024) show that short-time work has an immediate and over time decreasing negative effect on perceived employment security which is associated with lower levels of work satisfaction. The authors argue that this negative impact of short-time work stems from the reduction in working hours and income (Klug et al., 2024). While income loss is generally associated with reductions in SWB (Boyce et al., 2013; D'Ambrosio et al., 2020), the effects of working hour reduction are less clear and differ between socio-demographic sub-groups (Gallie et al., 2016; Möhring et al., 2021).

Research from the early phase of the pandemic shows that those transitioned to short-time work reported higher employment insecurity, and mostly lower work satisfaction (Möhring et al. 2020; Möhring et al., 2021). Also, short-time workers showed higher reductions in mental health, perceived employment security and work satisfaction even in the second wave of the pandemic in late 2020 (Schmidtke et al., 2023). Zoch et al. (2022) show for the early phase of the pandemic in Germany that short-time work was related to reductions in work satisfaction. Research findings for the early pandemic phase for the UK indicate that short-time work and furlough were associated with poorer prospects for future job security (Adams-Prassl et al., 2020b). Relying on cross-sectional data for Switzerland and Germany in April 2020, Tušl et al. (2021) report that short-time work was negatively associated with perceptions of working life. Further findings for Switzerland indicate a strong increase in the fear of job loss among short-time workers between April and October 2020. However, it must be noted that the number of employees affected by short-time work declined sharply during this period (Arni, 2020).

Following the theoretical considerations described above, it is not only relevant whether someone was affected by short-time work, but the status duration and its signalling effect must be considered. Based on the previous research on the scarring effect of unemployment, the negative impact of short-time work is likely to be stronger, the longer the status persists and/or the more often it repeats. By July 2021, the number of short-time workers reduced significantly as compared to the first phase of the pandemic (see Fig. 1), making those remaining in this status exceptional. Therefore, we assume that *being affected by short-time work will be associated with increases in perceived employment insecurity and reductions in work satisfaction in the short-term* (Hypothesis 1a). *The more persistent or repetitive short-time work is in the early phase*, *the more likely its negative effects will persist in the longer term* (Hypothesis 1b).

Previous studies on the relationship of working from home and work satisfaction show mixed results. Most studies point in the direction of a positive association between remote work and work satisfaction (Felstead & Henseke, 2017; Fonner & Roloff, 2010; Reuschke, 2019; Tušl et al., 2021; Wheatley, 2017; Zoch et al., 2022). Möhring et al. (2021) find no effect of transitioning to working from home on work satisfaction in the early phase of the pandemic in Germany. Bellmann and Hübler (2020) find no clear impact of working from home on job satisfaction, but a negative association with work-life balance. Niebuhr et al. (2022) report a negative association of weekly hours WFH and employment satisfaction. The results of Song and Gao (2020) indicate that working from home was linked to more

stress and less happiness. Further, positive associations with workplace isolation were found (Cooper & Kurland, 2002; Vega & Brennan, 2000).

Relating these findings back to our theoretical approach, the role of WFH for work-related well-being is ambiguous. It might signal employees a future redundancy of their job, especially when the further course of the pandemic and the containment measures are unclear. However, the fact that a job is transferrable to WFH might also increase feelings of security. Likewise, WFH is not clearly related to loss in resources apart from (temporarily) losing a working place in the office and personal contact to co-workers. Following conservation of resources theory, and due to the normalization of WFH over the course of the pandemic, rather the termination of WFH options may actually have implications for work-related well-being, for example, due to concerns about infection (Reifenscheid & Möhring, 2021) or about losing reconciliation opportunities. At the end of June 2021, the legal right to WFH was again abolished in Germany (see Fig. 1). Thus, we assume that *working from home in the early phase of the pandemic is not associated with changes in work satisfaction or perceived employment insecurity in the short-term and longer term* (Hypothesis 2a), *while a transition back to working on-site leads to a reduction in work satisfaction* (Hypothesis 2b).

3 Materials and Methods

We use data from the GIP, which is based on a random probability sample of the general population of Germany aged 16 to 75. The panel started in 2012 and was supplemented with additional participants in 2014 and 2018. The panel participants were recruited offline using strict statistical procedures (Blom et al., 2015). Every other month, panel participants are invited to take part in a voluntary online survey. At the onset of the COVID-19 pandemic, the GIP launched a special survey ('Mannheim Corona Study', MCS) on March 20, 2020, inviting 5,598 GIP panelists to take weekly surveys; thereof, 4,387 participated in at least one of the MCS surveys (Blom et al., 2020; Cornesse et al., 2022).[2] Response rates across the MCS observation period were stable with a range between 57.6% and 64.4% (Cornesse et al., 2022). The MCS had an overrepresentation of older respondents similar to, and a bias towards highly educated respondents higher than in the German General Social Survey (ALLBUS) (Cornesse et al., 2022).

For our analysis,[3] we employ GIP data of different time-points and periods: (1) pre-pandemic information stems from the latest available time-point before the pandemic, which is January 2020 for employment status and perceived employment insecurity, and September 2019 for work satisfaction; (2) employment trajectories in the early phase of the pandemic refer to the weekly data between March 20 and June 25, 2020; (3) short-term changes refer to perceived employment insecurity and work satisfaction measured in late June and July 2020 (after June 25); (4) longer term changes refer to these indicators measured in July 2021. In all analyses, we include only individuals who were in dependent employment in January 2020 and are below 68 years old. Furthermore, we exclude respondents with more

[2] For the MCS, all active GIP panelists were randomly divided into eight subgroups. Seven of these were invited to participate in the MCS (always at a specific day of the week), while the eighth was kept as control group not participating in the MCS (Blom et al., 2020; Cornesse et al., 2022).

[3] Replication files for the analysis are available at https://osf.io/pjh2w/.

than 30% missing employment status information in the weekly surveys (N=1,676; supplementary Fig. A1 provides the sample sizes for each step of sample selection).

Our analysis proceeds in two steps. We first apply sequence analysis to obtain a holistic understanding of the employment trajectories using weekly information for the period March 20 until June 25, 2020. This method is used to assess the (dis-)similarity of trajectories and to identify and visualise typical groups (Abbott, 1995). We treat respondents' employment trajectories as sequences with 14 elements, representing the 14 weeks of our observation window, which are categorised as one of six employment situations. We operationalise the employment situation based on information on employment status and location of work and differentiate the following categories: work usual hours on-site, work usual hours from home, short-time work, paid furlough, out of work, which includes unpaid furlough and unemployment, and other & no information.[4] Please note that in the German context, only those in short-time work are eligible for state top-up benefits as described above; furlough means being suspended from work without receiving state benefits (unlike Britain's temporary furlough scheme; Adams-Prassl et al., 2020b). Furloughed employees, however, may receive continued pay from their employer. Drawing on these six states, we compute sequence dissimilarities using Dynamic-Hamming distances, which are sensitive to the time-specific positioning of states and apply a cost structure based on empirical transition probabilities. The resulting dissimilarity matrix serves as the input for a hierarchical cluster analysis using Ward's (1963) method which minimizes within-cluster variance (Piccarreta & Billari, 2007). Based on goodness-of-fit measures and parsimoniousness, we decide on a seven cluster-solution (see supplementary Fig. A2). Subsequently, the Partitioning Around Medoids (PAM) clustering was applied to enhance the robustness and interpretability of the initial clustering and to arrive at the final cluster assignments (Studer, 2013). Sequence and cluster analysis were applied with the TraMineR package in R (Gabadinho et al., 2011).

To examine the composition of clusters of typical employment trajectories during the early phase of the COVID-19 pandemic, we include information on socio-demographic and economic characteristics, most of which are measured before the onset of the pandemic. These are: gender (female, reference category: male); a dummy variable indicating whether children under 16 were living in the household (yes, reference category: no; measured in spring/summer 2020); a dummy variable for migration background (yes (no German citizenship or not born in Germany), reference category: no); and a dummy variable for poor health based on subjective health status (reference category: partly good/partly bad, good, excellent health). Educational degree distinguishes between low (without or with basic school-leaving qualification), medium (intermediate school-leaving qualification), and high (higher education entrance qualification). Employment sectors are differentiated in four categories (manufacturing, service, public administration/education/health, other) and monthly personal net income into three categories (below 1,000 Euro, 1,000–2,500 Euro, above 2,500 Euro). These income categories refer to the 25 and 75% quartiles of the income distribution in the GIP including all respondents, yet this is a rough estimate as income was measured in 15 categories. The variables gender, migration background, educational degree, employment sectors, and personal net income are measured in GIP Wave 43, September 2019, while the subjective health status is measured in GIP Wave 45, January 2020.

[4] The category "other & no information" includes individuals who are in parental leave, in education or training, retired or do not provide information on their employment situation.

In the second step, analysing the association of employment trajectory clusters with changes in perceived employment insecurity and work satisfaction, we use linear regression models with the sequence clusters as main explanatory variable. As outcome, we consider short-term and longer term changes in perceived employment insecurity and work satisfaction during the COVID-19 pandemic. Perceived employment insecurity is operationalised as individuals' subjective assessment of the likelihood of job loss within the next twelve months; the measure is composed of five categories ranging from very low to very high. To indicate short-term changes, we use the change operationalised as the value from June/July 2020 subtracted from the value measured before the onset of the pandemic in January 2020; longer term changes are indicated as the difference between January 2020 and July 2021. The measure of work satisfaction is composed of eleven categories ranging from very unsatisfied to very satisfied. Short-term changes in work satisfaction are operationalised as the value from June/July 2020 subtracted from the value measured in September 2019; longer term changes are indicated as the difference between September 2019 and July 2021.

We first run regression models only including the employment trajectory clusters ('Model 1'), we then include socio-demographic and economic control variables i.e. gender, a dummy indicating children in the household, age, migration background, education, health status, employment sector, and personal net income ('Model 2'; see above for operationalization of variables). Finally, we include the employment situation at the time of the interview in June/July 2020 or July 2021, respectively ('Model 3'), which is operationalized similarly to the employment situation for the sequence analysis. Due to attrition and the inclusion of further independent variables in the regression models, the case numbers for the survey in June/July 2020 are reduced to $N=1{,}258$ for perceived employment insecurity and to $N=1{,}180$ for work satisfaction. For the survey in July 2021, case numbers are $N=1{,}167$ for perceived employment insecurity and $N=1{,}174$ for work satisfaction (see supplementary Table A1).

4 Results

4.1 Sequence Analysis of Employment Trajectories

Figure 2 depicts the state distribution and sequence index plots for seven clusters of employment trajectories in the early phase of the COVID-19 pandemic. Clusters 1 to 3 contain trajectories of individuals who continued to work in their job with usual hours over the observation period from March 20 to June 25, 2020. The majority of individuals (Cluster 1; $N=866$, 51.7%) continued to work on-site. The second-largest group almost continuously worked from home (Cluster 2; $N=307$, 18.3%), and a smaller fraction changed from remote work to working on-site midway through the observation period (Cluster 3; $N=191$, 11.4%). Those working continuously or initially from home mainly hold a comparatively high educational degree and high income before the outbreak of the pandemic, whereas those continuously working on-site in cluster 1 equally represent above average shares of medium educational attainment and medium pay (see Table 1 for socio-demographic composition of the clusters). Low-wage workers are particularly underrepresented in clusters with (partial) remote work.

Four further clusters contain individuals who reduced working hours or completely interrupted working. Individuals in cluster 4 ($N=132$; 7.9%) pursued predominantly on-

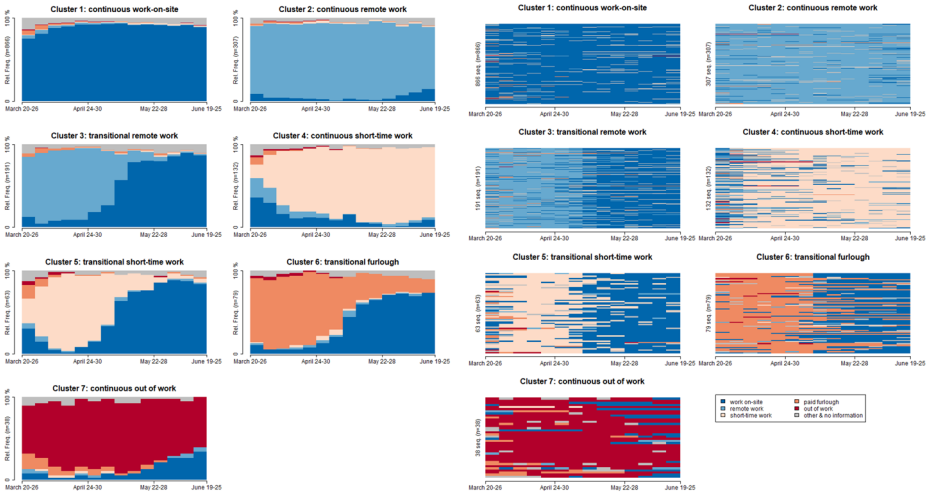

Fig. 2 State distribution plot (left) and sequence index plot (right) of the employment trajectories March 20 – June 25, 2020. Figure by Möhring, K., Weiland, A. P., Reifenscheid, M., Steins, P. J., & Dreier, M., licensed under CC BY 4.0. https://doi.org/10.17605/OSF.IO/PJH2W. *Notes*: Sample contains only individuals who were in dependent employment in January 2020. *Source*: German Internet Panel, own estimations

site work until the end of March/beginning of April 2020 and subsequently engaged in continuous short-time work until the end of the observation period at the end of June 2020. In cluster 5 ($N=63$; 3.8%), the transition into short-time work occurred on average earlier, immediately after the onset of the lockdown. In contrast to cluster 4, individuals in cluster 5 mostly transitioned back into their usual working hours in early May 2020. Both short-time clusters deviate in their sectoral composition. While cluster 4 of continuous short-time work is dominated by workers from the manufacturing sector, cluster 5 of transitional short-time work is more balanced between manufacturing, service, and other sectors. Further, individuals affected by short-time work are more likely to hold low or medium educational attainment and represent the low to intermediate income tier.

People who were furloughed with continued payment during the observation period are included in cluster 6 ($N=79$; 4.7%), with the majority having returned to their usual working hours by the end of May 2020. Cluster 7 ($N=38$; 2.3%) contains individuals who experienced unemployment or unpaid furlough in the first quarter of 2020; i.e. they transitioned at or shortly after the onset of the lockdown, or in the time between the GIP interview in January 2020 and the first interview of the COVID-19 survey in March 2020. Therefore, these transitions into unpaid furlough, but especially unemployment cannot be solely attributed to the COVID-19 pandemic. Whereas the furlough cluster was characterized by a high share of individuals from the public, educational and health sector, those out of work had predominantly been service sector employees. While the share of female workers is close to average in clusters 1 to 5, women are overrepresented in paid furlough or out of work clusters. In a similar vein, both clusters, but especially the latter exhibit above-average shares of workers with previously low earnings.

Table 1 Descriptive overview of cluster composition by socio-demographic characteristics in percentage shares

	Cluster							Total
	1: continuous work on-site	2: continuous remote work	3: transitional remote work	4: continuous short-time work	5: transitional short-time work	6: transitional furlough	7: continuous out of work	
Gender: female	48.2	44.4	46.6	38.6	50.8	68.4	57.9	47.8
Children in household: yes	26.4	37.6	35.6	42.4	19.0	32.9	18.4	30.6
Migration background: yes	07.1	7.4	8.0	10.1	16.4	10.4	10.5	8.1
Educational degree								
Low	11.9	2.9	3.7	14.4	25.8	8.9	13.2	9.9
Medium	42.5	15.7	13.1	37.1	40.3	30.4	50.0	33.3
High	45.6	81.4	83.2	48.5	33.9	60.8	36.8	56.8
Employment sector								
Manufacturing	23.7	22.1	18.9	41.4	33.3	11.0	5.6	23.7
Service	29.1	41.5	20.6	36.7	35.0	15.1	44.4	31.0
Public/education/health	35.1	24.6	51.7	6.2	06.7	64.4	33.3	33.0
Other	12.0	11.8	8.9	15.6	25.0	9.6	16.7	12.4
Personal net income								
<1000€	10.0	5.6	1.8	11.3	14.8	22.7	43.8	9.9
1000€-2500€	54.7	33.2	37.5	54.8	59.3	47.0	43.8	48.4
>2500€	35.3	61.2	60.7	33.9	25.9	30.3	12.5	41.7
Age groups								
18–35	18.2	23.2	28.8	25.8	17.5	15.2	23.7	20.9
36–49	27.7	41.5	34.0	40.2	19.0	32.9	18.4	31.6
50+	54.0	35.3	37.2	34.1	63.5	51.9	57.9	47.5
Health status: poor	2.6	2.0	1.6	0.8	7.9	11.5	7.9	2.9
Employment status (June/July 2020)								
Work on-site	89.1	19.3	86.4	15.2	87.3	75.9	28.9	68.2
Remote work	0.3	69.3	2.1	3.8	1.6	0.0	2.6	13.5
Short-time work	2.0	2.0	1.0	74.2	6.3	1.3	0.0	7.6
Paid furlough	0.2	0.7	0.0	0.0	1.6	13.9	0.0	1.0

Table 1 (continued)

	Cluster							Total
	1: continuous work on-site	2: continuous remote work	3: transitional remote work	4: continuous short-time work	5: transitional short-time work	6: transitional furlough	7: continuous out of work	
Out of work	0.3	0.0	0.0	0.8	0.0	1.3	57.9	1.6
Other & no information	8.0	8.8	10.5	6.1	3.2	7.6	10.5	8.1
Employment status (July 2021)								
Work on-site	81.8	26.5	77.0	56.1	78.7	73.9	34.3	67.9
Remote work	4.3	60.0	12.6	21.1	4.9	1.4	5.7	16.4
Short-time work	0.9	1.1	0.0	13.8	6.6	1.4	0.0	2.1
Paid furlough	0.4	0.4	0.0	0.8	0.0	2.9	0.0	0.5
Out of work	0.9	0.4	0.0	0.0	1.6	0.0	14.3	0.9
Other & no information	11.7	11.6	10.3	8.1	8.2	20.3	45.7	12.3
N	866	306	191	132	63	79	38	1,675

Source: German Internet Panel, own estimations

4.2 Changes in Perceived Employment Insecurity and Work Satisfaction across Clusters

In the next step, we examine the relationships of the employment trajectories in the first phase of the pandemic with short-term and more long-term developments in perceived employment insecurity and work satisfaction. Therefore, as described above, we focus on change, i.e. the difference in both indicators between pre-pandemic levels and their levels in (a) June/July 2020 and (b) July 2021. Due to data only being available for re-employed individuals and limited case numbers, respondents from the out-of-work cluster were excluded from the following analyses.[5] Fig. 3 depicts pre-pandemic values of perceived employment insecurity and work satisfaction.

Before the onset of the first lockdown, perceived employment insecurity is low with limited variance across clusters. Those in continuous or transitional short-time work at the onset of the pandemic, exhibit slightly elevated values in comparison to those later working on-site, remotely or experiencing furlough. Significant differences in perceived employment insecurity only exist between later continuous short-time workers and later transitional remote workers. Differences in pre-pandemic work satisfaction across clusters are not significant; generally, later remote workers experience the highest average work satisfaction at about 6.8, followed by continuous on-site with around 6.5 and continuous short-time as

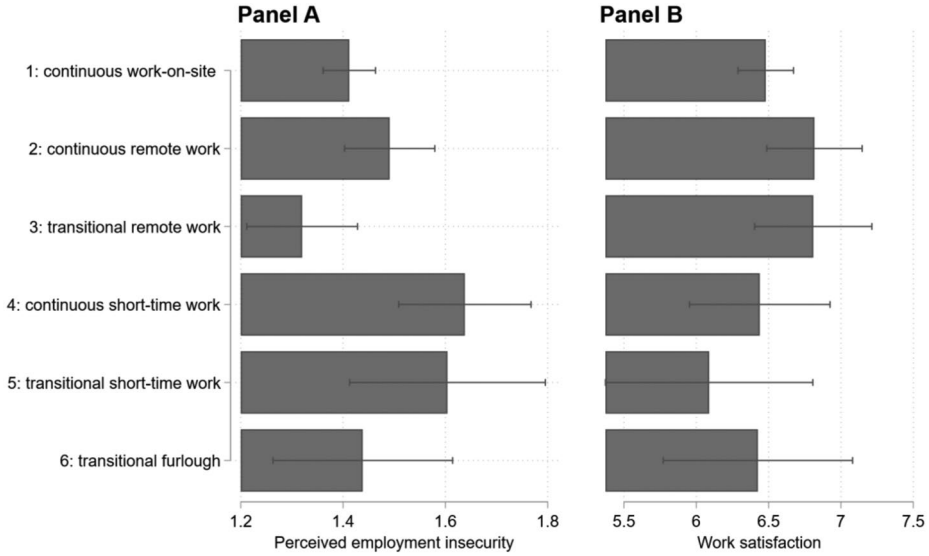

Fig. 3 Pre-pandemic means with 95% confidence intervals for perceived employment insecurity (Panel A) and work satisfaction (Panel B). Figure by Möhring, K., Weiland, A. P., Reifenscheid, M., Steins, P. J., & Dreier, M., licensed under CC BY 4.0. https://doi.org/10.17605/OSF.IO/PJH2W. *Notes*: Scale for perceived employment insecurity 1–5; for work satisfaction 0–10. *Source*: German Internet Panel, own estimations

[5] For those who had been continuously out of work during the early phase of the pandemic, employment insecurity and work satisfaction is only recorded for those eventually re-employed at the time of the interview. Therefore and due to the small number of cases, we excluded respondents from the out-of-work cluster from the main regression analyses.Robustness checks including cluster 7 can be found in supplementary Tables B5–B8.

well as transitional furlough workers with around 6.4. Later transitional short-time workers exhibit the lowest average work satisfaction at around 6.1.

Figures 4 and 5 show the regression models with the changes in perceived employment insecurity and work satisfaction as outcomes and the clusters as main explanatory variables. Predicted values of the outcome variables for the employment trajectory clusters based on three regression models are presented: Model 1 establishes a baseline, depicting raw differences between clusters without controls, Model 2 adds controls on individual socio-demographic and economic status, and Model 3 additionally controls for the employment status at the time of the interview in June/July 2020 and July 2021, respectively. Predicted change values are included in supplementary Tables A2-A5. Full regression models are included in supplementary Tables B1-B4.

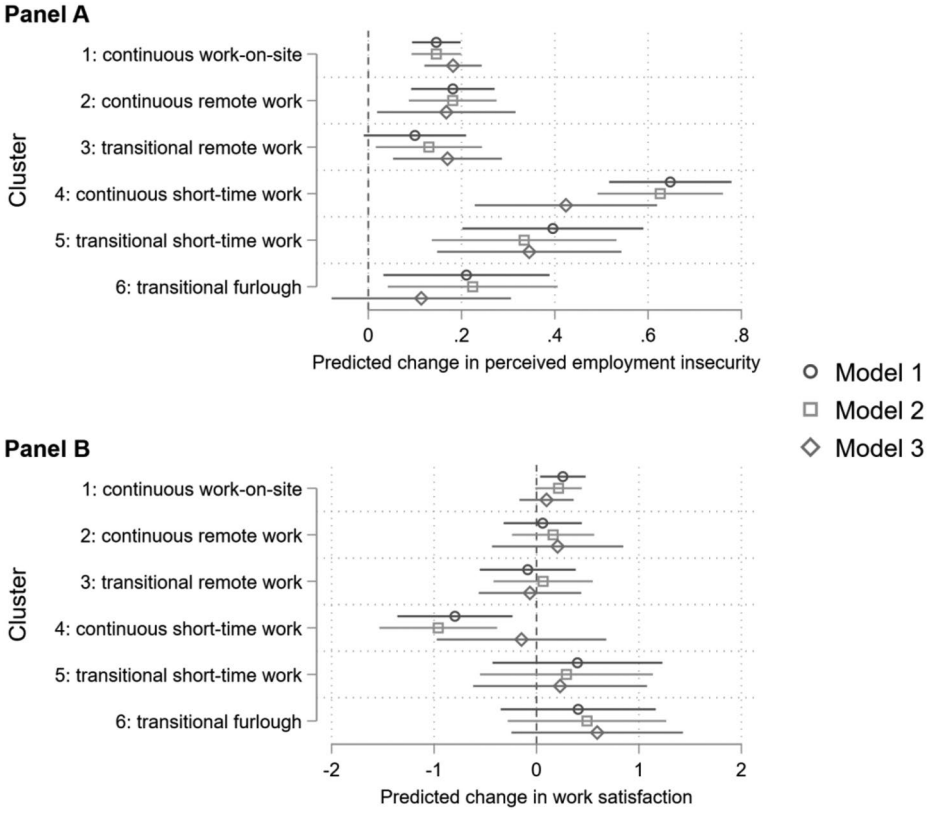

Fig. 4 Predicted change in perceived employment insecurity (Panel **A**) and in work satisfaction (Panel **B**) between pre-pandemic levels and June/July 2020. Figure by Möhring, K., Weiland, A. P., Reifenscheid, M., Steins, P. J., & Dreier, M., licensed under CC BY 4.0. https://doi.org/10.17605/OSF.IO/PJH2W. *Notes*: Model 2 with controls (gender, age, migration background, educational degree, health status, employment sector, personal net income, children in household). In Model 3, current employment status is additionally controlled for (levels: work on-site, remote work, short-time work, paid furlough, other & no information). Scale for perceived employment insecurity 1–5; for work satisfaction 0–10. Predicted values provided with 95% confidence intervals. Predicted change values are included in supplementary Tables A2 and A3. Full regression models are included in supplementary Tables B1 and B2. *Source*: German Internet Panel, own estimations

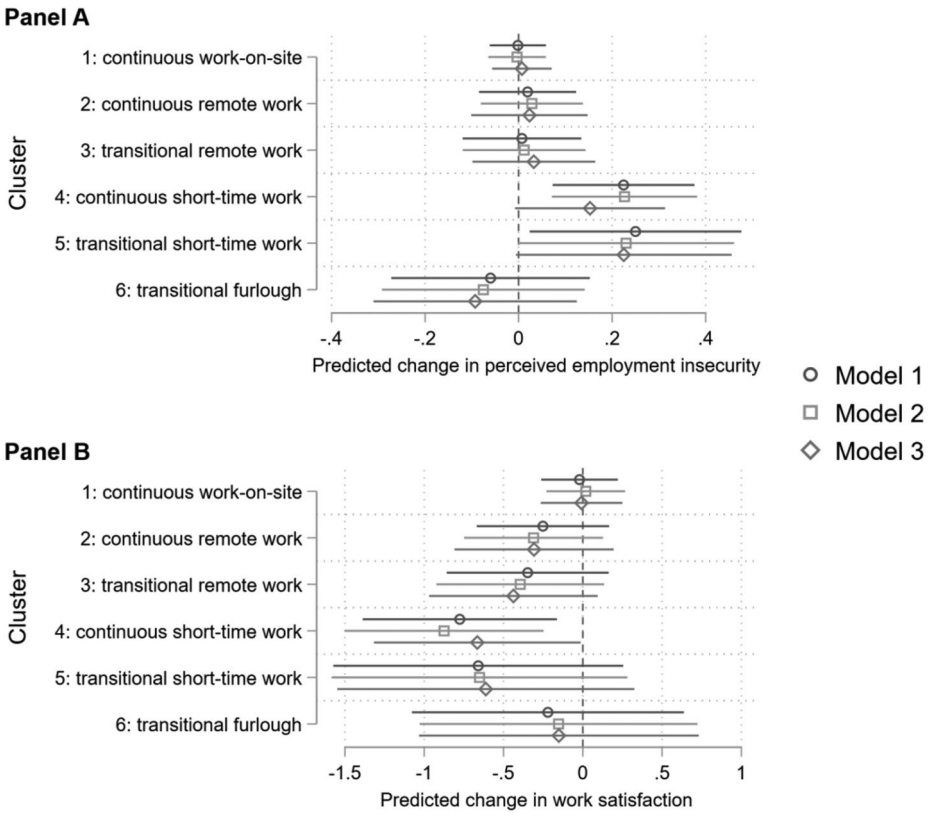

Fig. 5 Predicted change in perceived employment insecurity (Panel **A**) and in work satisfaction (Panel **B**) between pre-pandemic levels and July 2021. Figure by Möhring, K., Weiland, A. P., Reifenscheid, M., Steins, P. J., & Dreier, M., licensed under CC BY 4.0. https://doi.org/10.17605/OSF.IO/PJH2W. *Notes*: Model 2 with controls (gender, age, migration background, educational degree, health status, employment sector, personal net income, children in household). In Model 3, current employment status is additionally controlled for (levels: work on-site, remote work, short-time work, paid furlough, other & no information). Scale for perceived employment insecurity 1–5; for work satisfaction 0–10. Predicted values provided with 95% confidence intervals. Predicted change values are included in supplementary Tables A4 and A5. Full regression models are included in supplementary Tables B3 and B4. *Source*: German Internet Panel, own estimations

For the change in perceived employment insecurity between January and June/July 2020, we find a significant increase ($p<0.05$) in comparison to pre-pandemic levels for most clusters, in particular those in continuous and transitional short-time work during the early stage of the pandemic (Model 1 in Fig. 4, Panel A). Here, in the basic model, perceived employment insecurity is about 0.65 points higher for continuous short-time workers and 0.40 for transitional. This is followed by individuals in transitional furlough and continuous remote work with an increase of about 0.21 and 0.18, respectively, as well as those having worked on-site continuously with around 0.15 points ($p<0.05$). The transitional remote work cluster exhibits an increase in perceived employment insecurity by 0.10 points, however, only sig-

nificant with $p<0.1$[6]. Controlling for individuals' socio-demographic and economic characteristics yields similar predicted values and ranking, with the exception that the change in perceived employment insecurity for individuals in transitional remote work in the early stage of the pandemic becomes significant ($p<0.05$, Model 2). When additionally accounting for current employment status, perceived employment insecurity in June/July 2020 is not significantly higher than pre-pandemic levels for individuals in transitional furlough during the early stage of the pandemic ($p<0.05$, Model 3).

Next, we explore how work satisfaction changed in the early pandemic employment trajectories between the pre-pandemic levels and June/July 2020 (Fig. 4, Panel B). Most groups, including those working continuously or transitionally from home, exhibit no significant changes in work satisfaction even after controlling for socio-demographic and economic characteristics. Individuals in continuous on-site work exhibit about 0.22 points higher levels in work satisfaction ($p<0.1$, Model 2). Those in continuous short-time work during the early stage of the pandemic exhibit about 0.96 points lower satisfaction with work in June/July 2020 in comparison to pre-pandemic levels ($p<0.05$, Model 2). Model 3 indicates that this decrease in work satisfaction seems to be predominantly driven by current employment status instead of cluster membership. The employment trajectory during the early stage of the pandemic appears to be less relevant than whether individuals are (still) in short-time work in summer 2020.

Subsequently, we examine to which extent the employment situation in the early phase of the pandemic is related to longer term changes in perceived employment insecurity and work satisfaction between pre-pandemic values and July 2021 (Fig. 5). With respect to perceived employment insecurity, individuals who belonged to the continuous on-site, continuous remote work, transitional remote work and transitional furlough cluster during the early stage of the pandemic exhibit no significant changes in comparison to pre-pandemic values (Models 1–3 in Fig. 5, Panel A). In contrast, among those affected by short-time work, either continuously or transitionally, perceived employment insecurity is significantly increased at 0.22 and 0.25 scale points (Model 1). After controlling for socio-demographic characteristics and current employment status (Model 3), increases in perceived employment insecurity remain significant for both short-time work clusters only on a $p<0.1$ level. Thus, the previous experience of short-time work in the early phase of the pandemic is related to increases in perceived employment insecurity also in the longer term, however the current employment situation plays a large role in buffering this relationship.

Finally, we examine the changes in work satisfaction between pre-pandemic levels and June/July 2021 (Models 1–3 in Fig. 5, Panel B). Here, only individuals who were in continuous short-time work during the early phase of the pandemic exhibit a significant decrease in work satisfaction by approximately 0.88 scale points after controlling for socio-demographic and economic characteristics ($p<0.05$, Model 2). This relationship persists when accounting for current employment status. For transitional short-time workers, the decrease in work satisfaction is on a similar level albeit not statistically significant.

[6] Figs. 4 and 5 show 95% confidence intervals. Statistical significance at the 0.1 level is indicated in supplementary Tables A2–A5.

5 Discussion and Conclusion

In this study, we examined how employment trajectories of employees in Germany were affected during the early phase of the COVID-19 pandemic and to what extent these changes implied consequences for perceived employment insecurity and work satisfaction in the short- and longer term. Applying sequence analysis, we identified seven clusters of employment dynamics during the early stages of the pandemic which can be broadly categorized according to the timing and volatility of changes in the employment situation: (1) the state is persistent over the whole observation period, as is the case for the continuous on-site, continuous remote, continuous short-time and out of work clusters; (2) the state is transitional – those affected returned to working their usual hours on-site in late April to early May when the containment measures were eased – as is the case for transitional short-time, transitional furloughed and transitional remote workers. The immediate employment consequences during the first phase of the COVID-19 pandemic mirror the existing segmentation of the German labour market. Regardless of employment sector, employees with medium educational attainment and income experienced the fewest changes as they predominantly continued to work on-site with their usual hours. Highly educated employees in the internal segment of the service sector were to a larger extent able to WFH. Employees in low-wage employment in the service sector were particularly negatively affected by unpaid furlough and job loss, in the public sector by paid furlough. In contrast, transitional and especially continuous short-time work was more likely among employees in manufacturing.

Hypothesis 1 suggested (a) short-term increases in perceived employment insecurity and reductions in work satisfaction for short-time workers, and (b) that these changes in both outcomes should be more likely to show in the longer term among those who were in more persistent short-time work during the early phase of the pandemic. For those who switched to teleworking temporarily or continuously in the initial phase of the pandemic, we assumed in Hypothesis 2 that (a) job satisfaction or perceived job insecurity will not change in the short term, but that (b) job satisfaction will decrease in June 2021 due to the expiry of the WFH measures.

In accordance with Hypothesis 1a, a preliminary rise in perceived employment insecurity was observed among short-time workers during the period of June/July 2020. However, also other groups demonstrate increases in perceived employment insecurity, albeit on a lower level than for short-time workers. These groups include those remaining in on-site work with no changes in working hours and those changing to remote work for a limited or longer timespan. The implications for work satisfaction in the short term are much less pronounced. Only continuous short-time workers experience a loss in work satisfaction, which is strongly reduced and turns insignificant after controlling for current employment status and socio-demographic composition. Consequently, the disruptions experienced in the early stages of the pandemic were widely perceived as stressful, resulting in feelings of insecurity and fear of status loss. This was particularly pronounced among those affected by working hour reductions, although it was also evident among more privileged groups, such as those transitioning to remote work. However, these findings did not demonstrate a concomitant decline in work satisfaction. Therefore, evidence for Hypotheses 1a and 2a is mixed; while we find the immediate reduction of perceived employment security to be general and not

restricted to—but most pronounced among—short-time workers, work satisfaction in June/July 2020 remains widely unchanged as compared to pre-pandemic levels.

The longer-term effects of the pandemic show a different picture. Perceived employment insecurity has mostly returned to pre-pandemic levels. Those who experienced short-time work early in the pandemic remain with an increase in perceived insecurity, however, on a much lower level compared to summer 2020, and statistically insignificant after controlling for socio-demographic composition and current employment status. In contrast to summer 2020, we see a general decline in work satisfaction in summer 2021 compared to pre-pandemic levels. This decline is visible in all groups, apart from those who continuously worked on-site in the early phase of the pandemic, however, is significant only for those with experience of continuous short-time work. Interestingly—and in contrast to the reduction in perceived employment insecurity—this is independent from their current employment status in July 2021. Therefore, evidence for Hypotheses 1b and 2b is again mixed; we find an insignificant reduction in work satisfaction among those in remote work, and some longer term adverse effects for short-time workers. Disparities between transitional and continuous short-time workers are negligible, and mainly appear in terms of significance, not in direction or strength of the effects. Therefore, the results indicate that short-term work experience may have a lasting adverse effect on work satisfaction.

Relating these findings to our theoretical framework, we find some support for the distinction of transactional stress theory and conservation of resources theory. Overall, our results show an immediate rise of perceived insecurity in large parts of the labour force, while in the longer term negative implications are more evident for work satisfaction. In line with our theoretical considerations, the former can be interpreted as direct stress effects, while the latter can be interpreted as a more lasting sign of the (felt) loss of resources during the pandemic. The lower longer term work satisfaction in the group of continuous short-time workers may reflect ongoing challenges, such as supply chain disruptions, but may also show a more long-term negative signalling of short-time work. Additionally, this result is in line with the long-term SWB consequences of short-time work as demonstrated in previous research on pre-pandemic job-retention schemes (Klug et al., 2024). Herein, results underscore the potential non-monetary implications of short-time work, which are by extension also relevant for the employers of workers perceiving their jobs as insecure or less satisfying. This might open avenues in subsequent labour market research for a more detailed consideration of covariates we could not account for, such as more specific company and occupational characteristics.

Our study provides evidence on the longer term consequences employment changes during the COVID-19 pandemic and highlights the importance of analysing the dynamics of employment trajectories instead of focussing on isolated statuses or single transitions. This was possible due to the longitudinal nature of the GIP data and the high frequency of its special COVID-19 survey. Some limitations of our study, however, are the reduction in case numbers when we link several time-points before and during the pandemic and the low case numbers for specific subgroups such as young labour market entrants and migrants. In line with this, selective attrition patterns can occur to a limited extent, as specific subgroups or early pandemic trajectories may be more likely to drop out of the panel. However, the overall panel quality of the GIP is very high (Blom et al., 2016). Further, it is not possible to observe changes between two employers when these are not related to a temporal change in employment status, which might however relate to perceived employ-

ment insecurity and work satisfaction. Another limitation pertains the restricted possibilities to analyse more fine-grained sector-specific developments. However, our analysis is based on high-frequency data for the German working-age population embedded in an ongoing bimonthly panel study and based on a random population sample. Therefore, in contrast to sector- or company-specific studies, we can provide a broad picture on the implications of the pandemic and the containment measures on individuals' work situation, also allowing a more general identification of vulnerable sub-populations. Nevertheless, further research is needed to monitor long-term employment changes more detailed and to better understand the situation for specific subgroups of employees. This also includes changes that may manifest over a longer time horizon than the one considered in this study.

Supplementary Information The online version contains supplementary material available at https://doi.org/10.1007/s11205-025-03663-1.

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Data Availability Replication files for the analysis are available at https://osf.io/pjh2w/. The data of the German Internet Panel and the Mannheim Corona Study are freely available for scientific use. Further information can be found here: https://www.uni-mannheim.de/en/gip/using-gip-data/.

Declarations

Competing Interests The authors have no potential conflicts of interest.

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