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Cort W. Rudolph, Mindy K. Shoss, and Hannes Zacher

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Dynamic and Reciprocal Relations Between Job Insecurity and Physical and Mental Health

Cort W. Rudolph[1], Mindy K. Shoss[2], and Hannes Zacher[3]
[1] Department of Psychology, Wayne State University
[2] Department of Psychology, University of Central Florida
[3] Wilhelm Wundt Institute of Psychology, Leipzig University

This article reports the results of a 33-wave longitudinal study of relations between job insecurity and physical and mental health based on monthly data collected between April 2020 and December 2022 among $n = 1,666$ employees in Germany. We integrate dynamic theorizing from the transactional stress model and domain-specific theorizing based on stressor creation and perception to frame hypotheses regarding dynamic and reciprocal relations between job insecurity and health over time. We find that lower physical health predicted subsequent increases in job insecurity and higher physical health predicted subsequent decreases in job insecurity. However, job insecurity did not have a significant influence on physical health. Furthermore, higher job insecurity predicted subsequent decreases in mental health, and higher mental health predicted subsequent decreases in job insecurity. This pattern of findings suggests a dynamic and reciprocal within-person process wherein positive deviations from one's average trajectory of job insecurity are associated with subsequently lower levels of mental health and vice versa. We additionally find evidence for linear trends in these within-person processes themselves, suggesting that the strength of the within-person influence of job insecurity on mental health becomes more strongly negative over time (i.e., a negative amplifying cycle). This research provides practical insights into job insecurity as a health threat and shows how concerns about job loss following deteriorations in physical and mental health serve to further threaten well-being.

Keywords: job insecurity, physical health, mental health, occupational health, autoregressive latent trajectory model with structured residuals

Job insecurity, defined as "a threat to the continuity and stability of employment as it is currently experienced" (Shoss, 2017, p. 1911) and poor employee health have both been identified as major issues facing today's workforce (American Psychological Association, 2023; Blustein et al., 2020). Studies often cite macrolevel factors, such as market conditions and the rapidly changing nature of work, as reasons for experienced job insecurity. For example, the COVID-19 pandemic involved threats to economic stability that exacerbated existing concerns about the continuity of employment in a variety of industries (e.g., Akkermans et al., 2020; El Khawli et al., 2022). At the same time, many workers experienced threats to their physical and mental health, which may have challenged their ability to maintain employment (Antino et al., 2022; Low et al., 2021).

Poor physical and mental health have long been theorized to be outcomes of job insecurity (e.g., De Witte et al., 2016), and meta-analytic evidence for negative cross-sectional associations between job insecurity and health is often taken as support for this directional relation (Jiang & Lavaysse, 2018). Reflecting this paradigmatic view, De Witte et al. (2016) concluded that "job insecurity influences health and wellbeing over time, rather than the other way around" (p. 18). In contrast to the job insecurity literature that sees health as an outcome, the literature on occupational health more typically views health status as a predictor of work ability (Ilmarinen, 2009; McGonagle et al., 2015; Tengland, 2011). From this perspective, poor physical and mental health are causes of job insecurity rather than, or in addition

to, the consequences of job insecurity because poor health threatens individuals' ability to perform their jobs (Griep et al., 2021).

In support of both perspectives, there is some evidence speaking to potential long-term reciprocal relations between job insecurity and health. For example, across a 5-year timeframe, Vander Elst et al. (2018) found that job insecurity predicted later depression, which was subsequently associated with higher levels of future job insecurity (see also De Cuyper et al., 2012). Similarly, Griep et al. (2021) found positive reciprocal associations between job insecurity and mental health concerns, which emerged between the second and third waves of a three-wave data collection with 6-month intervals between time points. Likewise, Urbanaviciute et al. (2019) found reciprocal between-person relations between job insecurity and self-reported health in a five-wave study with 1-year time intervals.

These findings are suggestive of potential reciprocal relations between job insecurity and health, but the dynamics of these relations remain unknown. This is because existing studies have used a small number of relatively long time lags (e.g., three waves collected across 5 years; Vander Elst et al., 2018; two waves collected across 1 year; De Cuyper et al., 2012) and have typically used analytic strategies that do not separate between- and within-person relations (e.g., Griep et al., 2021; Ibrahim et al., 2009; Urbanaviciute et al., 2019). This approach makes it difficult to assess directionality, stability, and change in these relations over time (Hamaker et al., 2015) and may mask shorter term and more frequently occurring dynamic change-to-change relations that would be anticipated based on stress theory. In other words, the immediate nature of stress responses implies that individuals are unlikely to delay their reactions to stressful experiences, such as job insecurity or declining health, for extended periods (e.g., 6 months, 1 year). Indeed, physical and mental health are commonly defined as the quality of functioning over a 1-month period, as this period is more likely to capture clinically significant changes in functioning (Ware et al., 1996). As a result, whereas existing research may speak to accumulated and reciprocal influences of job insecurity and health existing over relatively long periods of time, more research is needed to understand how such relations emerge and are dynamic across shorter (i.e., 1 month) periods (e.g., Dormann & Griffin, 2015).

This study advances dynamic theory and empirical findings about the relation between job insecurity and health. From a conceptual perspective, we integrate discussions of dynamic processes within the transactional stress model (Lazarus, 1991; Lazarus et al., 1985) and recently revived theorizing on the potential work-related consequences of poor health (Guthier et al., 2020; Lang et al., 2011) to suggest dynamic and reciprocal relations between job insecurity and physical and mental health. By mapping the dynamics implied by this theorizing onto more formal components of dynamic models (Olenick & Dishop, 2022), we develop a deeper conceptual understanding of how these important variables relate to each other over time. Additionally, studying how job insecurity, health, and the reciprocal relations between these variables may change is useful for integrating the job insecurity and occupational health literatures, which have likely been looking at "two sides of the same coin."

Methodologically, we adopt a longitudinal design that investigates job insecurity and physical and mental health across 33 monthly measurement waves from a large sample ($n = 1,666$) of employees in Germany from early April 2020 to early December 2022. This timeframe overlaps with the course of the COVID-19 pandemic, which was declared by the World Health Organization in mid-March 2020, including its most acute phases and periods of relatively lower infection rates. We use a novel analytic strategy (the autoregressive latent trajectory model with structured residuals [ALT-SR model; Mund & Nestler, 2019; see also Curran et al., 2014) that allows us to separate stable (i.e., between-person) from dynamic (i.e., within-person) relations, as well as average trajectories in variables over time, which have not been considered in previous studies of job insecurity and health. This approach enables us to model the four elements needed for dynamic analyses: the assessment of a variable's autoregressive tendency toward stability over time, forces that act on a variable to produce change, feedback loops, and the magnitude of dynamic (i.e., change to change) relations (Olenick & Dishop, 2022; Pitariu & Ployhart, 2010). This rich data set coupled with these sophisticated analyses provides novel and important insights about the ways that job insecurity-health relations emerge and change over time. Doing so provides conceptual and practical insights into trends in job insecurity and ill-health, which are long-standing global concerns (e.g., Ponsonby, 2017; Standing, 2014).

Theoretical Background and Hypothesis Development

Theoretical Background

At a basic level, job insecurity reflects a subjectively appraised future-oriented threat (i.e., potential job loss; De Witte, 1999). We conceptualize health in terms of people's perceived functional health, referring to the impact of physical (e.g., limitations in physical activities due to physical health problems) and mental health (e.g., limitations in social activities due to mental health problems) on everyday life (e.g., Jenkinson et al., 1997). As noted, the job insecurity literature typically views health as an outcome of job insecurity (De Witte et al., 2016). This focus aligns with (a) the historical focus in job insecurity research on major organizational change or macrolevel events (e.g., recessions), as well as (b) the perspective that job insecurity would be expected to stimulate a near-universal stress reaction because of the concomitant threats to livelihood, identity, and routine that occur with potential job loss, and (c) research showing that individuals generally view threats to job security as uncontrollable (Sirola, 2024; Vander Elst et al., 2016). From this perspective, the perception of threat to one's job is expected to trigger a heightened and sustained psychophysiological response that has negative repercussions for health (Greco & Roger, 2003; Voigt et al., 1990; Zakowski, 1995). At the same time, the growing literatures on work ability and health at work position job insecurity as an appraisal tied to one's physical and mental functioning (Ilmarinen, 2009; McGonagle et al., 2015; Tengland, 2011). Indeed, ill-health may constitute a vulnerability to long-term employment, as maintaining paid work is, to some extent, predicated on the maintenance of physical and mental functioning over time (Cai, 2010).

We suggest that these two perspectives can be reconciled through the dynamic processes predicted by the transactional stress model (Lazarus et al., 1985). Although many adoptions of the transactional stress model assign variables to certain roles (e.g., the "stressor" vs. the "strain"), Lazarus et al. (1985, p. 777) criticized the stress literature for categorizing constructs based on "where in the flow of psychological events one chooses to begin and end the analysis" rather than recognizing how health and stress-related variables change as part of a dynamic system over time. The transactional stress

model therefore conceptualizes the nature of the dynamics of stress-related processes such that individuals' reactions to an initial triggering condition can cause or worsen that condition or create other cascading threats to health and well-being in the long term (see also Thoits, 1983). Practically speaking, consider a hypothetical employee who tries to cope with anxiety by reducing their effort at work. Over time, their performance declines, which becomes a cause of worry for the security of their employment and the source of greater anxiety. This example illustrates that it can be difficult to designate health as the cause or the effect, and it is likely a distinction with few practical implications.

Lazarus et al. (1985) offered that although depictions of the transactional stress model place health problems as an outcome for the sake of illustration, health problems are often a major cause of perceived threat and stress for individuals. This dynamic has been somewhat lost in work stress research, likely due to the limited availability of methodological tools for assessing dynamic relations. However, the transactional stress model provides a strong metatheoretical perspective from which to examine dynamic job insecurity—health relations over time because poor health is identified therein as a source of threat and stress, although the specific rationale for why this can occur in an employment setting has yet to be articulated.

We supplement this perspective with two potential "strain effects" outlined by Guthier et al. (2020) to provide greater detail as to why physical and mental health have influences on job insecurity, which has received less attention in the literature. Specifically, Guthier et al. (2020) described various ways that poor well-being, broadly construed, can create threats over time, two of which—the *stressor creation* and *stressor perception* hypotheses—are applicable here. The *stressor creation hypothesis* proposes that poor or declining health is more likely to increase employees' job insecurity by threatening individuals' work ability over time (Leijten et al., 2014). Poor or declining health, or negative health "shocks," are likely to breed concerns about one's ability to perform and maintain their jobs. To this end, Sirola (2024) found that job insecurity was associated with exhaustion, which contributed to supervisor's willingness to recommend a given employee for a layoff.

The *stressor perception* hypothesis suggests that employees with poor or declining health, or who experience negative health "shocks," might also perceive higher levels of job insecurity because poor health status leads to changes in subjective evaluations of job insecurity. Accordingly, those experiencing lower relative levels of physical and mental health may see themselves as being particularly vulnerable to precarity in their work environments. This mechanism has also been described as the affective perception/reaction assumption in work stress research (Lang et al., 2011).

Hypothesis Development

The combination of the transactional stress model and hypothesizing on "strain effects" suggests that job insecurity and poor physical and mental health demonstrate dynamic relations over time. At the between-person level, this implies change-to-change relations (i.e., associations between average trajectories of health and job insecurity). At the within-person level, this theorizing leads to the prediction that increases in job insecurity are likely to lead to more health problems due to increased stress appraisals. Within-person decreases in job insecurity, reflecting greater security, are

likely to ease the psychophysiological response and result in relative improvements in physical and mental health. Similarly, acute worsening of physical and mental health likely triggers concerns about one's job security, whereas improvements in health may lessen health-induced threats to job insecurity. Accordingly, we hypothesize:

> *Hypothesis 1:* Job insecurity and health have mutually reinforcing and dynamic relations with one another over time. This occurs at the (a) between-person level, such that those who experience increases (i.e., positive trajectories) in job insecurity will also experience decreases (i.e., negative trajectories) in health, and at the (b) within-person level, such that over time, stronger positive deviations from one's average trajectory of job insecurity are associated with stronger negative deviations from one's average trajectory of health.

The above discussion and predictions speak directly to how job insecurity and physical and mental health act to produce change in each other over time and to anticipated reciprocal relations, or "feedback loops," which are central predictions of dynamic models (Berry & Willoughby, 2017; Olenick & Dishop, 2022). A full specification of a dynamic model also requires theorizing about whether variables are anticipated to show stability (i.e., autoregressive tendencies) over time. In other words, one needs to predict whether health is solely determined by one's absolute value of job insecurity at a given time or whether job insecurity promotes relative changes in health from a given starting point. In terms of dynamic systems, variables demonstrating some inertia over time are called *level variables* (Vancouver & Colton, 2020). Shoss and Vancouver (2024) recently conceptualized job insecurity as a level variable because it captures a belief about one's future risk of job loss, which would be anticipated to be updated regularly but also to demonstrate some stability over time. Health would also be anticipated to exhibit autoregressive tendencies, as one's past health status sets a foundation for one's future health status. Theoretical support for the stability of job insecurity and health over time can be drawn from adaptation-level theory (e.g., Helson, 1948) and opponent process theory (e.g., Solomon & Corbit, 1978), which suggest a degree of equilibrium present in perceptions of workplace events (see Bowling et al., 2005). In line with these arguments, research has shown that job insecurity (e.g., Mauno et al., 2001) and physical and mental health (e.g., Der-Martirosian et al., 2010) show some degree of stability over time. That is, people with higher levels of job insecurity and better health at one time point are also likely to have higher levels of job insecurity and better health at subsequent time points because the residual influence of variables at one point in time "carries over" to another. Given these lines of reasoning, we predict:

> *Hypothesis 2:* Job insecurity and health demonstrate stability such that they show positive autoregressive tendencies over time.

The transactional stress model, along with other related models of stress (e.g., Hobfoll, 1989), suggests that reactions to threats can spark further threats. However, it is not yet well understood whether these "threat-to-threat" relations change in intensity as time

progresses (i.e., do threat-inducing reactions to threats amplify or diminish over time?). An advantage of dynamic models with many time points is the ability to assess whether these reciprocal relations exhibit changes in *strength* over time (Pitariu & Ployhart, 2010). In other words, these analyses assess whether within-person changes in job insecurity or health have larger influences on within-person changes in the other over time. This analysis is meaningful in the context of the present study because data collection begins at a known point in response to a major societal event, the COVID-19 pandemic, which induced job and health threats. Moreover, our analyses allow for distinguishing changes in overall trends in job insecurity and health from changes in the strength of within-person relations. We address this potential in an exploratory manner by investigating whether a model that allows for variability in within-person change-to-change relations over time fits better than a model that assumes stability in the strength of these relations.

Method

Study Design, Participants, and Procedure

The ethics advisory board of Leipzig University (Protocol ID 2019.06.27_eb_17 and study title: "Longitudinal Study of Work Experience and Behavior") approved this study. Participation was voluntary and anonymous; informed consent was obtained from all participants. We measured job insecurity and physical and mental health 33 times, first in early April 2020 (Time [T] 3), then every month thereafter until December 2022 (T35). Several demographic and employment characteristics, including age, sex, education, income, and industry, were assessed at T1 (i.e., December 2020) and at T22 (i.e., November 2021; the latter assessment was necessary to collect demographic information from two $n = 500$ refresher samples that were added at T6 and at T9). We contracted an International Standards Organization 26362 certified professional panel company to recruit participants from a nationally representative panel in Germany. The International Standards Organization certification helps ensure the quality of our survey data. Importantly, because of various social safety nets (e.g., "short term work" or "Kurzarbeit"; see Rauvola et al., 2022), Germany has relatively low levels of job insecurity, and especially so during the COVID-19 pandemic (Ibanescu et al., 2023).

Participants had to be working full-time and be at least 18 years old to qualify for participation in this study. Regarding recruitment and retention of participants over time, at T1, 4,839 people from the panel company's database were contacted. Of these initial contacts, 1,899 people started completing the survey and provided (at minimum) partial responses (e.g., demographics, substantive variables; response rate of 39.24%) at T1. An average of 1,134 ($SD = 199$; range = 868–1,646) people provided (at minimum) partial responses between T3 and T35 (n.b., 135 participants provided complete responses to the focal variables at all 33 time points; see Table 1). The panel considered in the present study comprised $n = 1,666$ employees, who provided responses to job insecurity and physical or mental health at least three times across the 33 possible waves of this study. Three data points are regarded as the minimum number required to model longitudinal change (see Ployhart & Vandenberg, 2010). Sample descriptive statistics and plots of means for each variable over time, as well as average trajectories for a random sample of $n = 10$ respondents, can be found in our additional online material (https://osf.io/89yvj/).

Measures

Reliabilities are reported as means and ranges across time points for which measures were collected (see additional online material at https://osf.io/89yvj/, for complete reliability results).

Job Insecurity

At all 33 time points, job insecurity was assessed with the four-item scale from the German version of the Copenhagen psychosocial questionnaire II: "In the last 4 weeks I worried about …" (a) "… becoming unemployed," (b) "… new technologies making me redundant," (c) "… it being difficult for me to find another job if I became unemployed," (d) "… being transferred to another job against my will" (Kristensen et al., 2005; Nübling et al., 2006). Responses to each item were collected on a 5-point scale ranging from 1 (*strongly disagree*) to 5 (*strongly agree*). Scale scores were constructed by averaging these four items, such that lower (higher) scores indicate stronger job (in)security. Reliabilities observed over time were acceptable ($\alpha_{mean} = .884$, $\alpha_{range} = .809–.909$; $\omega_{mean} = .904$; $\omega_{range} = .852–.933$).

Physical and Mental Health

We measured physical and mental health at each of the 33 time points using the German language version of the short form 12 health survey (Gandek et al., 1998; Ware et al., 1996). This measure assesses physical and mental health components, with items reflecting four distinct health domains per component. For physical health, the health domains include physical functioning, physical role functioning, bodily pain, and general health; for mental health, the domains include vitality, social functioning, emotional role functioning, and mental health. For physical health, an example item is: "In the past four weeks, how much did pain interfere with your normal work (including both work outside the home and housework)?" with an associated rating scale ranging from 1 (*not at all*) to 5 (*extremely*). For mental health, an example item is: "In the past four weeks, how much of the time have you felt calm and peaceful?" with an associated rating scale ranging from 1 (*all of the time*) to 5 (*none of the time*). Following Bullinger and Kirchberger (1998), physical and mental health component scores were computed using a standardized scoring algorithm. The resulting component scores are interpreted on a 100-point scale, with higher (lower) scores indicating "better" ("worse") health. Reliabilities across health components were acceptable for both physical health ($\alpha_{mean} = .924$, $\alpha_{range} = .868–.996$; $\omega_{mean} = .929$; $\omega_{range} = .876–.996$) and mental health ($\alpha_{mean} = .919$, $\alpha_{range} = .844–.996$; $\omega_{mean} = .941$; $\omega_{range} = .894–.996$).

Demographics

Three demographics (i.e., age, sex, education) and two employment characteristics (i.e., income, industry) were collected from respondents at T1 and T22 (the latter referring to refresher samples). We report these demographics and employment characteristics as descriptive statistics in Table 1 as a means of characterizing these features of our sample.

Table 1
Sample Demographics and Comparisons of Complete and Incomplete Responders

Variable	T1–T35 incomplete (*n* = 1,531)	T1–T35 complete (*n* = 135)	*p*	T3–T33 panel (*n* = 1,666)
Age (years)				
M (*SD*)	46.00 (11.10)	46.60 (9.36)	.46[a]	46.00 (11.00)
Mdn (min, max)	46.00 (18.00, 71.00)	47.0 (23.00, 69.00)		47.00 (18.0, 71.00)
Missing	1 (0.10%)	0 (0.00%)		1 (0.10%)
Gender				
Male	840 (54.90%)	86 (63.70%)	.06[b]	926 (55.60%)
Female	689 (45.00%)	49 (36.30%)		738 (44.30%)
Missing	2 (0.10%)	0 (0.00%)		2 (0.10%)
Education				
Lower secondary school	104 (6.80%)	2 (1.50%)	.11[b]	106 (6.40%)
Intermediate secondary school	542 (35.40%)	49 (36.30%)		591 (35.50%)
Upper secondary school	264 (17.20%)	27 (20.00%)		291 (17.50%)
College/university or technical college	603 (39.40%)	55 (40.70%)		658 (39.50%)
Missing	18 (1.20%)	2 (1.50%)		20 (1.20%)
Monthly household income (Euros/month)				
€0–€999	223 (14.60%)	19 (14.10%)	.34[b]	242 (14.50%)
€1,000–€1,999	344 (22.50%)	21 (15.60%)		365 (21.90%)
€2,000–€2,999	350 (22.90%)	31 (23.00%)		381 (22.90%)
€3,000–€3,999	272 (17.80%)	32 (23.70%)		304 (18.20%)
€4,000–€4,999	135 (8.80%)	14 (10.40%)		149 (8.90%)
€5,000–€5,999	48 (3.10%)	7 (5.20%)		55 (3.30%)
€6,000–€6,999	94 (6.10%)	9 (6.70%)		103 (6.20%)
Missing	65 (4.20%)	2 (1.50%)		67 (4.00%)
Industry				
Primary and secondary sectors	182 (11.90%)	16 (11.90%)	1.00[b]	198 (11.90%)
Tertiary sector	1,313 (85.80%)	119 (88.10%)		1,432 (86.00%)
Missing	36 (2.40%)	0 (0.00%)		36 (2.20%)
T3 job insecurity				
M (*SD*)	1.96 (0.92)	1.83 (0.82)	.10[a]	1.94 (0.91)
Mdn (min, max)	1.75 (1.00, 5.00)	1.75 (1.00, 4.00)		1.75 (1.00, 5.00)
Missing	706 (46.10%)	0 (0.00%)		706 (42.40%)
T3 physical health				
M (*SD*)	49.7 (8.32)	50.20 (8.28)	.50[a]	49.70 (8.31)
Mdn (min, max)	52.20 (11.6, 63.60)	52.40 (23.90, 63.10)		52.20 (11.6, 63.60)
Missing	699 (45.70%)	0 (0.00%)		699 (42.00%)
T3 mental health				
M (*SD*)	45.9 (9.60)	47.20 (8.60)	.13[a]	46.10 (9.47)
Mdn (min, max)	47.40 (5.02, 67.10)	48.70 (24.70, 63.60)		47.40 (5.02, 67.10)
Missing	699 (45.70%)	0 (0.00%)		699 (42.00%)

Note. Age was represented as time since birth (in years), and sex was represented as a binary variable (i.e., 0 = *male*, 1 = *female*). Education was operationalized as the highest educational attainment, ranging from 0 (*lower secondary school*) to 3 (*college/university or technical school*). Income was assessed as monthly household income ranging from 0 (*€0–€999*) to 7 (*€6,000–€6,999*). Industry was conceptualized as a binary variable (0 = *primary & secondary sectors*, 1 = *tertiary sector*), referring to industries involved in the extraction of raw materials and manufacturing (i.e., primary and secondary sectors) and service industries (i.e., tertiary sector). T = time; *Mdn* = median; min = minimum; max = maximum.
[a] *p* values derived from *t* tests.   [b] *p* values derived from chi-square tests.

Analytical Strategy

An ALT-SR (Mund & Nestler, 2019; see also Curran et al., 2014) was used to test our focal hypotheses. We specified the model within a structural equation modeling framework using the R package {lavaan} (Rosseel, 2012) Version 0.6-15 with a maximum likelihood estimator. The ALT-SR allows for simultaneously modeling within-person cross-lagged relations (i.e., "feedback loops"; see Berry & Willoughby, 2017, p. 1202) between adjacent time points (i.e., T_k job insecurity predicting T_{k+1} health; T_k health predicting T_{k+1} job insecurity). The ALT-SR simultaneously accounts for between-person intercepts (i.e., average person levels) and slopes (i.e., average trajectories of change over the entire study period) associated with these variables. It is important for research to account for such systematic change in

variables when examining potential reciprocal relations, especially if there are known macrolevel factors (e.g., the COVID-19 pandemic) that increase the likelihood of such changes (Shoss & Vancouver, 2024).

Traditional cross-lagged panel models conflate between-person and within-person sources of variance, leading to ambiguous conclusions about the level (i.e., between-person, on average vs. within-person, dynamic) at which relations occur (Hamaker et al., 2015). The ALT-SR overcomes these challenges by cleanly separating between- from within-person processes while allowing flexibility in the parametrization of change over time (e.g., by modeling the form of within-person cross-lagged relations). Accordingly, the interpretation of cross-lagged relations in ALT-SR models bears some consideration here. Consistent with Hypothesis 1b, the framing of positive and negative observed cross-lagged relations, reflecting higher or lower

overtime processes, should be interpreted as deviations from one's average (i.e., overall) trajectory. That is, within-person cross-lagged relations can be understood in terms of deviations from average (i.e., between-person) trajectories (i.e., slopes) of any given variable (see Curran et al., 2014, p. 885). Thus, a positive cross-lagged relation occurs when people who score higher than their average trajectory on one variable subsequently tend to score higher than their average trajectory on the other variable. In contrast, a negative cross-lagged relation occurs when people who score higher than their average trajectory on one variable subsequently score lower than their average trajectory on the other variable.

Figure 1 presents a simplified representation (i.e., two variables measured across four time points) of an example ALT-SR borrowed from Mund and Nestler (2019). To reduce computational burden and to match our hypotheses posed above, we specified our focal model with all overtime parameters (i.e., autoregressive and cross-lagged relations) fixed to equality. We also considered additional models that systematically freed these assumptions (i.e., a model with fixed autoregressive and free cross-lagged relations; a model with completely free autoregressive and cross-lagged relations). Finally, in an exploratory capacity, we considered models that specify linear constraints (i.e., κ) on cross-lagged relations (see Curran et al., 2014, Formula 17) to test for systematic changes in such relations over time. Unless otherwise stated, all parameter estimates for overtime relations we report here are in their raw (i.e., unstandardized) metric.

To address the role of missing data, we considered a series of descriptive analyses that compared complete (i.e., participants in all 33 waves; $n = 135$) and incomplete (i.e., participants in 3–33 waves; $n = 1,531$) responders from our panel (see also Table 1). Importantly, no statistically significant differences were observed between demographic and employment characteristics or substantive variables (at T3) for complete and incomplete responders. Moreover, in a logistic regression model, these variables only explained 0.7% ($R^2 = .007$) of the variance in complete versus incomplete response status. Our additional online material (https://osf.io/89yvj/) contains the complete results of this analysis. In estimating our models, we used full information maximum likelihood to account for observed missingness.[1]

Transparency and Openness

Our additional online material contains the data used, R code to reproduce all analyses, and the complete results of all models described at https://osf.io/89yvj/. We adhered to the methodological checklist provided by the *Journal of Applied Psychology*, and our hypotheses were not preregistered. We collected the data used in this article as part of a larger and ongoing longitudinal study, representing 35 measurement waves across 3 years (i.e., collected between December 2019 and December 2022). Of note, in this larger study, job insecurity was only assessed starting in April 2020 (T3). Therefore, we focus on 33 monthly measurement waves in the current article, at which measures of both job insecurity and health were collected. Several articles that are based on the same longitudinal data set but that address different research questions have been published (Koziel et al., 2021; Rauvola et al., 2022, 2024; Rudolph et al., 2022; Rudolph & Zacher, 2021, 2023, 2024a, 2024b; D. Weiss et al., 2022; M. Weiss et al., 2022; Zacher,

2024; Zacher et al., 2021; Zacher & Rudolph, 2021a, 2021b, 2024a, 2024b).

Results

As an initial step in modeling overtime change, we considered measurement invariance of job insecurity and physical and mental health at three equidistant time points (i.e., T3, T19, T35) to reduce computational demands. Briefly, metric invariance was upheld across time for job insecurity and physical and mental health; complete results of these models can be found in our additional online material (https://osf.io/89yvj/), along with descriptive statistics and correlations among substantive variables.[2] There was a notable amount of within-person variability in job insecurity and health over time, as indexed by ICC_1 statistics (i.e., between 30.20% and 36.60% of the variability in job insecurity and health occurred within person over time).

Table 2 summarizes the results of the ALT-SR model specified to test our focal hypotheses and Figure 2 summarizes relevant parameters to illustrate this model. This model fit the data well, $\chi^2(4, 908) = 8,936.192$, CFI = .963, TLI = .963, RMSEA = .022, 95% CI [.021, .023], SRMR = .032. There are multiple "parts" to the ALT-SR model, described using notation adapted from Curran et al. (2014). In terms of growth parameters, representing average between-person levels (i.e., intercepts; α) and changes (i.e., slopes; β), we noted statistically significant ($p < .05$) negative average trajectories of job insecurity ($\beta_{ji} = -.007$) and physical health ($\beta_{ph} = -.040$) and positive average trajectories of mental health ($\beta_{mh} = .035$). These suggest that, on average, job insecurity and physical health declined across time and mental health increased across time in this sample.

Regarding Hypothesis 1a, which corresponds with correlations between slopes represented within the ALT-SR model, we noted significant ($p < .05$) correlations (ψ) between slopes (corresponding to curved, double-headed arrows between slopes in Figure 1), representing "change-to-change" relations that are dynamic (on average) over time. Specifically, the correlations between the slopes of job insecurity and physical health ($\psi_{\beta_{ji} \beta_{ph}} = -.153$) and between the slopes of job insecurity and mental health ($\psi_{\beta_{ji} \beta_{mh}} = -.383$) were both significant and negative, suggesting that changes in job insecurity and changes in both dimensions of health are inversely related. Additionally, the correlation between the slope of physical health and mental health was significant and positive ($\psi_{\beta_{ph} \beta_{mh}} = .149$), suggesting that changes in physical health and mental health are positively related. Thus, we find support for Hypothesis 1a.

Regarding Hypothesis 1b, which refers to within-person cross-lagged relations within the ALT-SR model (e.g., $\rho_{ji \to ph}$, $\rho_{ph \to ji}$, corresponding to the labeled "c" pathways in Figure 1; recall that these are interpreted in terms of deviations from average trajectories), we noted that job insecurity at time (T) T_k is not

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[1] We also ran a sensitivity analysis based on respondents with at least 50% of time points completed ($n = 1,020$). In summary, the model fit the data well, and the substantive conclusions reached from this model were equivalent to our focal analyses. Complete results are available in our additional online material (https://osf.io/89yvj/).

[2] We also considered additional tests of measurement invariance before and after the second COVID-19 lockdown in Germany (between T10/November 2020 and T17/June 2021), which represented an environmental shock. By means of nested model comparisons, metric invariance was upheld for all variables except physical health (however, evidence from supporting fit indices did support invariance). Complete results are available in our additional online material (https://osf.io/89yvj/).

Figure 1
Autoregressive Latent Trajectory Model With Structured Residuals (ALT-SR)
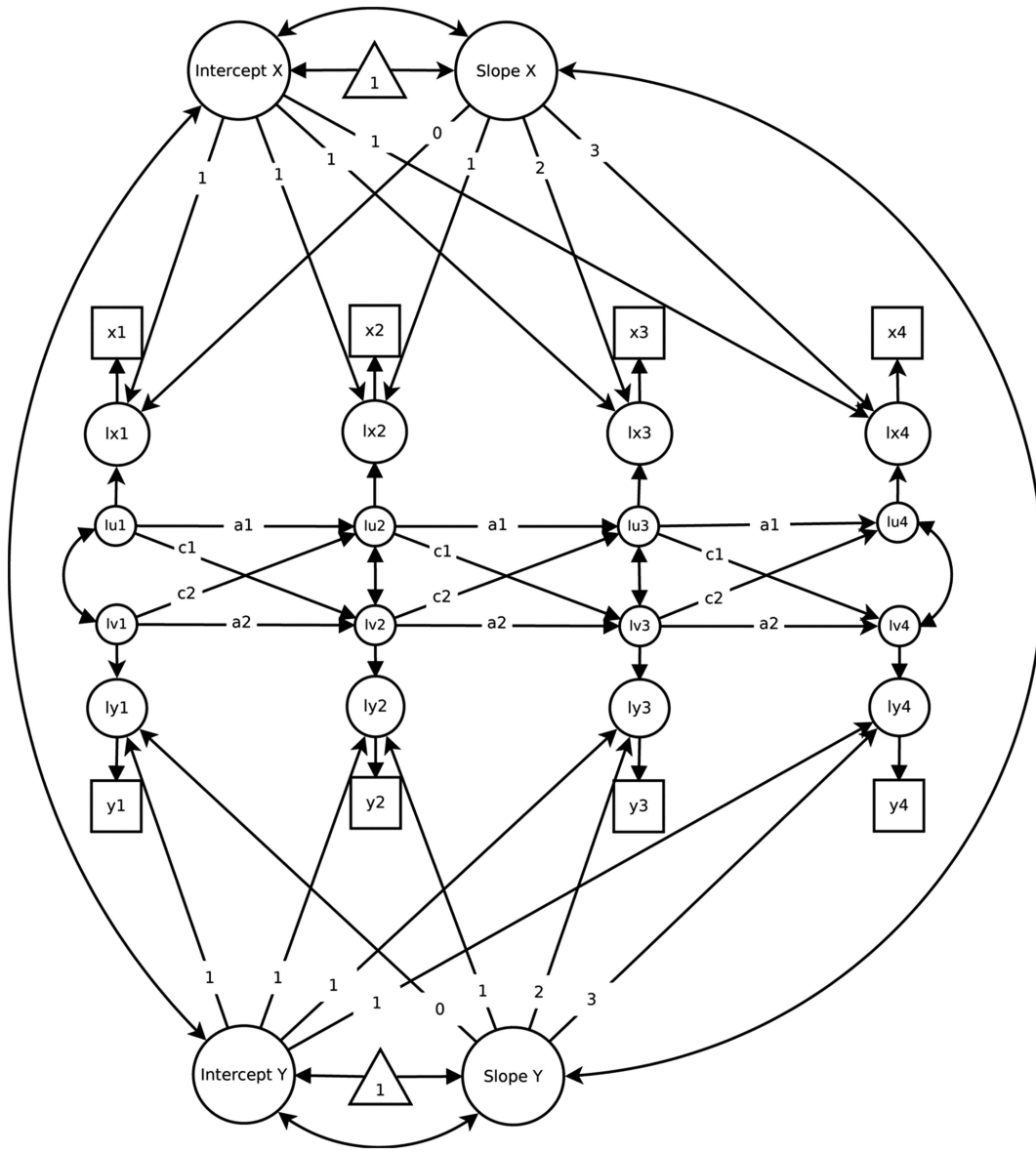
Note. In terms of notation represented here: x1–x4: observed variables *x*; lx1–lx4: latent variables *x*; lu1–lu4: residuals for latent variables *x*; y1–y4: observed variables *y*; ly1–ly4: latent variables *y*; lv1–lv4: residuals for latent variables *y*; a1: autoregressive relations for *x*; a2: autoregressive relations for *y*; c1: cross-lagged relations for *y* regressed onto *x* (i.e., $x \rightarrow y$); c2: cross-lagged relations for *x* regressed onto *y* ($y \rightarrow x$). In parameterizing slopes in the present study, time was coded as 0, 1, 2, 3, …, 32 to represent linear growth across 33 periods; accordingly, intercepts represent initial levels (i.e., at "T1"). From "Beyond the Cross-Lagged Panel Model: Next-Generation Statistical Tools for Analyzing Interdependencies Across the Life Course," by M. Mund and S. Nestler, 2019, *Advances in Life Course Research*, *41*, p. 5 (https://doi.org/10.1016/j.alcr .2018.10.002). Copyright 2018 by Elsevier. T = time.

significantly associated with physical health at T_{k+1}. However, physical health at T_k is negatively associated ($p < .05$) with job insecurity at T_{k+1} ($\rho_{ph \rightarrow ji} = -.001$). This suggests that physical health predicts subsequently lower levels of job insecurity but not vice versa. We also noted that job insecurity at T_k is negatively associated ($p < .05$) with mental health at T_{k+1} ($\rho_{ji \rightarrow mh} = -.272$). Additionally, mental health at T_k is also negatively associated with

job insecurity at T_{k+1} ($\rho_{mh \rightarrow ji} = -.003$). Thus, taken together, this evidence suggests partial support for Hypothesis 1b, with findings of reciprocal within-person relations observed only for mental health.

We also noted that physical health at T_k is positively associated ($p < .05$) with mental health at T_{k+1} ($\rho_{ph \rightarrow mh} = .059$), whereas mental health at T_k is positively associated with physical health at

Table 2

Summary of Focal ALT-SR Model Parameters

Parameter type/parameter	Est.	*SE*	*Z*	*p*	95% CI LL	95% CI UL	Std. est.
Autoregressive relations							
$\rho_{ji \to ji}$	0.113	0.007	16.298	<.001	0.099	0.126	0.107
$\rho_{ph \to ph}$	0.203	0.007	28.546	<.001	0.189	0.216	0.222
$\rho_{mh \to mh}$	0.194	0.007	27.211	<.001	0.180	0.208	0.200
Cross-lagged relations							
$\rho_{ji \to ph}$	0.025	0.067	0.381	.703	−0.105	0.156	0.003
$\rho_{ji \to mh}$	−0.272	0.071	−3.833	<.001	−0.411	−0.133	−0.027
$\rho_{ph \to ji}$	−0.001	0.001	−2.196	.028	−0.003	0.000	−0.015
$\rho_{ph \to mh}$	0.059	0.007	8.195	<.001	0.045	0.073	0.062
$\rho_{mh \to ji}$	−0.003	0.001	−4.887	<.001	−0.004	−0.002	−0.030
$\rho_{mh \to ph}$	0.048	0.006	7.542	<.001	0.035	0.060	0.051
Growth parameters							
α_{ji}	1.883	0.021	91.299	<.001	1.843	1.924	2.354
α_{ph}	49.818	0.178	279.105	<.001	49.469	50.168	7.375
α_{mh}	46.112	0.213	216.013	<.001	45.693	46.530	5.600
β_{ji}	−0.007	0.001	−11.289	<.001	−0.008	−0.006	−0.384
β_{ph}	−0.040	0.006	−6.841	<.001	−0.051	−0.028	−0.248
β_{mh}	0.035	0.006	5.673	<.001	0.023	0.047	0.203
Variances of growth parameters							
$\sigma^2_{\alpha ji}$	0.640	0.024	26.133	<.001	0.592	0.688	1.000
$\sigma^2_{\alpha ph}$	45.626	1.852	24.642	<.001	41.998	49.255	1.000
$\sigma^2_{\alpha mh}$	67.810	2.633	25.755	<.001	62.650	72.971	1.000
$\sigma^2_{\beta ji}$	0.000	0.000	16.144	<.001	0.000	0.000	1.000
$\sigma^2_{\beta ph}$	0.025	0.002	13.416	<.001	0.022	0.029	1.000
$\sigma^2_{\beta mh}$	0.030	0.002	14.033	<.001	0.026	0.034	1.000
Correlations among growth parameters							
$\psi_{\alpha ji\ \alpha ph}$	−0.391	0.024	−16.261	<.001	−0.438	−0.344	−0.391
$\psi_{\alpha ji\ \alpha mh}$	−0.569	0.019	−29.776	<.001	−0.606	−0.531	−0.569
$\psi_{\alpha ph\ \alpha mh}$	0.232	0.027	8.626	<.001	0.179	0.284	0.232
$\psi_{\beta ji\ \beta ph}$	−0.153	0.047	−3.250	<.001	−0.246	−0.061	−0.153
$\psi_{\beta ji\ \beta mh}$	−0.383	0.042	−9.163	<.001	−0.465	−0.301	−0.383
$\psi_{\beta ph\ \beta mh}$	0.149	0.051	2.898	<.001	0.048	0.250	0.149
$\psi_{\alpha ji\ \beta ji}$	−0.261	0.032	−8.123	<.001	−0.324	−0.198	−0.261
$\psi_{\alpha ji\ \beta ph}$	0.011	0.038	0.293	.769	−0.063	0.085	0.011
$\psi_{\alpha ji\ \beta mh}$	0.084	0.037	2.280	.023	0.012	0.157	0.084
$\psi_{\alpha ph\ \beta ji}$	0.050	0.037	1.362	.173	−0.022	0.122	0.050
$\psi_{\alpha ph\ \beta ph}$	−0.185	0.038	−4.935	<.001	−0.259	−0.112	−0.185
$\psi_{\alpha ph\ \beta mh}$	−0.004	0.039	−0.110	.912	−0.081	0.072	−0.004
$\psi_{\alpha mh\ \beta ji}$	0.078	0.035	2.220	.026	0.009	0.148	0.078
$\psi_{\alpha mh\ \beta ph}$	−0.018	0.038	−0.466	.641	−0.093	0.057	−0.018
$\psi_{\alpha mh\ \beta mh}$	−0.256	0.034	−7.442	<.001	−0.323	−0.188	−0.256

Note. $n = 1,666$. "Growth parameters" define latent trajectories in terms of latent intercepts and slopes. Estimates are derived from our focal ALT-SR model, which specified parameters to be fixed to equality over time. JI = job insecurity; PH = physical health; MH = mental health; ρ = autoregressive and cross-lagged parameters; α = latent intercepts; β = latent slopes; σ^2 = variances; ψ = correlations; ALT-SR = autoregressive latent trajectory model with structured residuals; est. = parameter estimate; *SE* = standard error; CI = confidence interval; *LL* = lower limit; *UL* = upper limit; std. est. = standardized parameter estimate.

T_{k+1} ($\rho_{mh \to ph}$ = .048). Thus, there was evidence for a positive, reciprocal overtime relation between physical and mental health. The explanatory power of this model at the within-person level of analysis was notable, with variance explained estimates (R^2) ranging from 0.85% to 1.39% for job insecurity (R^2_{mean} = 1.14%), 2.26%–4.02% for physical health (R^2_{mean} = 3.21%), and 2.61%–3.73% for mental health (R^2_{mean} = 3.11%). Following the advice of Orth et al. (2024) regarding effect sizes for within-person cross-lagged relations (i.e., .02 for a small effect, .05 for a medium effect, and .11 for a large effect), the relations observed here range from small to medium (see standardized estimates in Table 2).

Finally, regarding Hypothesis 2, which refers to autoregressive relations from the ALT-SR model (e.g., $\rho_{ji \to ji}$, corresponding to the pathways labeled "a" in Figure 1), we noted significant ($p < .05$) and positive "stabilities" in job insecurity and physical and mental health ($\rho_{ji \to ji}$ = .113; $\rho_{ph \to ph}$ = .203; $\rho_{mh \to mh}$ = .194). Thus, we find support for Hypothesis 2.

Additional Analyses

We specified three additional and competing ALT-SR models that freed overtime parameters in our focal model into both partially and fully unrestricted models. First, we considered a partially unrestricted model, where cross-lagged relations were freely estimated and autoregressive relations were constrained to equality over time. Second, we specified a fully unrestricted model, where all autoregressive and cross-lagged

Figure 2

Summary of Relevant Parameters From Focal Autoregressive Latent Trajectory Model With Structured Residuals (ALT-SR) Model
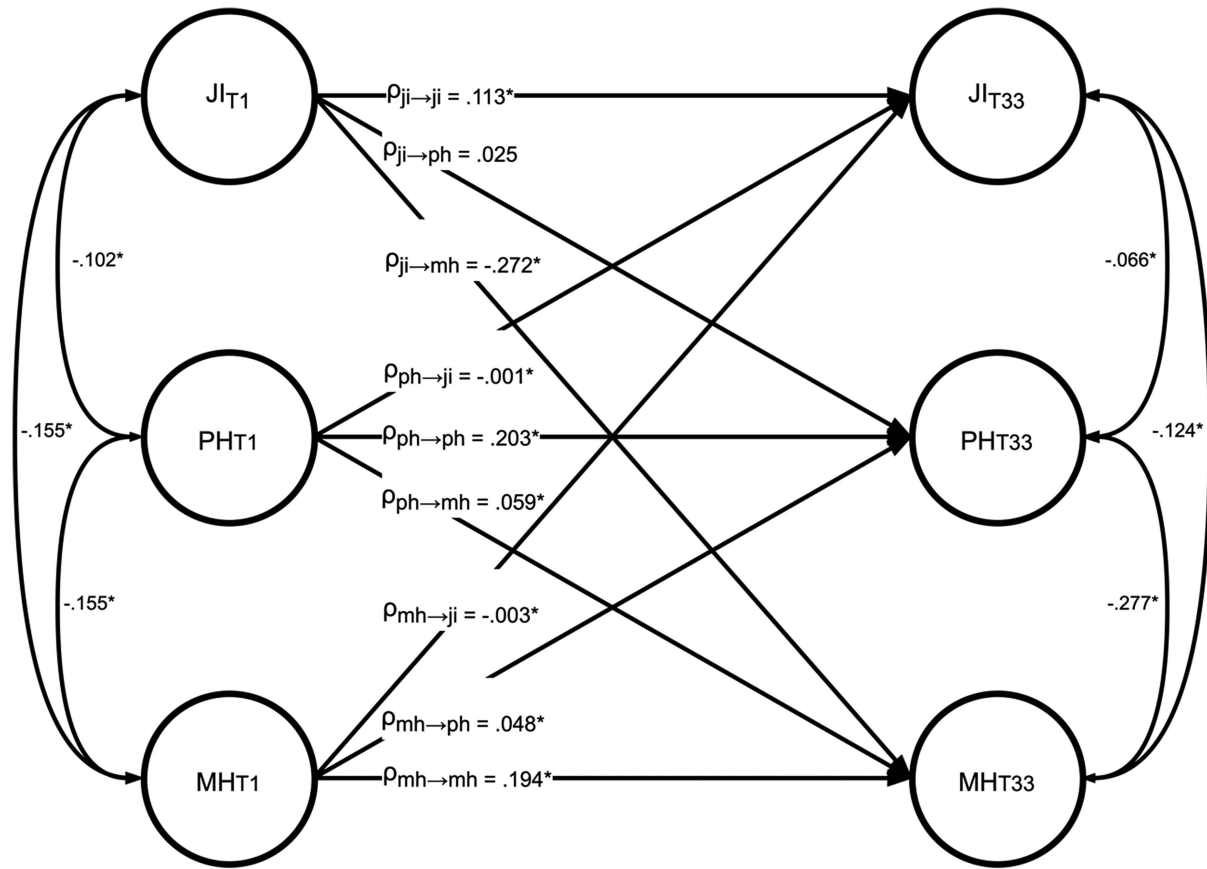
Note. $n = 1,666$. The estimates reported coincide with those reported in Table 2 and are taken from our focal model, with parameters fixed to equality over time. JI = job insecurity; PH = physical health; MH = mental health; T = time.
* $p < .05$.

relations were freely estimated. The complete results of these analyses can be found in our additional online material (https://osf.io/89yvj/). Figure 3 displays Tausendfüßler (English: "centipede") plots, depicting standardized autoregressive and cross-lagged relations of job insecurity and health in the fully unrestricted model. Importantly, when comparing the fits of these less-constrained models to our focal models, we observed improvements in absolute model fit (i.e., as indexed by χ^2 difference tests); however, the relative fit of these models (indexed by CFI, TLI, and RMSEA values) was comparable between our focal and alternative models. We prefer the more parsimonious representation of these data reflected in our focal models, which are most consistent with our theorizing and hypotheses. However, we present all specifications here in service of transparency and openness.

From this fully unrestricted specification, we noted that there are slight linear trends in the patterns of within-person cross-lagged relations between job insecurity and mental health and vice versa (see Figure 3; no such trends were obvious for the within-person cross-lagged relations between job insecurity and physical health).

To formally test whether these trends are statistically significant, we respecified this model with linear constraints (i.e., κ) imposed on

the within-person cross-lagged relations (see Curran et al., 2014, Formula 17) to test for systematic changes in the strength of these relations over time. We find evidence for a significant negative linear trend in the within-person influence of job insecurity on mental health (i.e., $\kappa_{ji \to mh} = -.027$; see Figure 4), suggesting that the strength of this lagged association became more strongly negative across the study period.[3]

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[3] We also considered supplemental analyses of long-run and accumulated effects using formulae and approaches from Shamsollahi et al. (2022, Formula 7). The long-run effect of job insecurity on mental health was $-.004$ (95% CI [$-.005$, $-.002$]) and of mental health on job insecurity $-.306$ (95% CI [$-.459$, $-.152$]). This implies that if an individual were to increase their job insecurity (mental health) by one unit and maintain this over time, their mental health (job insecurity) would adjust to a new equilibrium that is .004 (.306) units *lower* compared to their initial levels (in the units of the original variables). Accumulated effects corroborate these long-run effects and our analyses of linear constraints on unconstrained cross-lagged effects (i.e., κ); job insecurity is especially associated with accumulated and long-run declines in mental health over time. Complete results of both supplemental analyses are available in our additional online material (https://osf.io/89yvj/).

Figure 3
Fully Unrestricted Autoregressive and Cross-Lagged Relations of Job Insecurity and Health
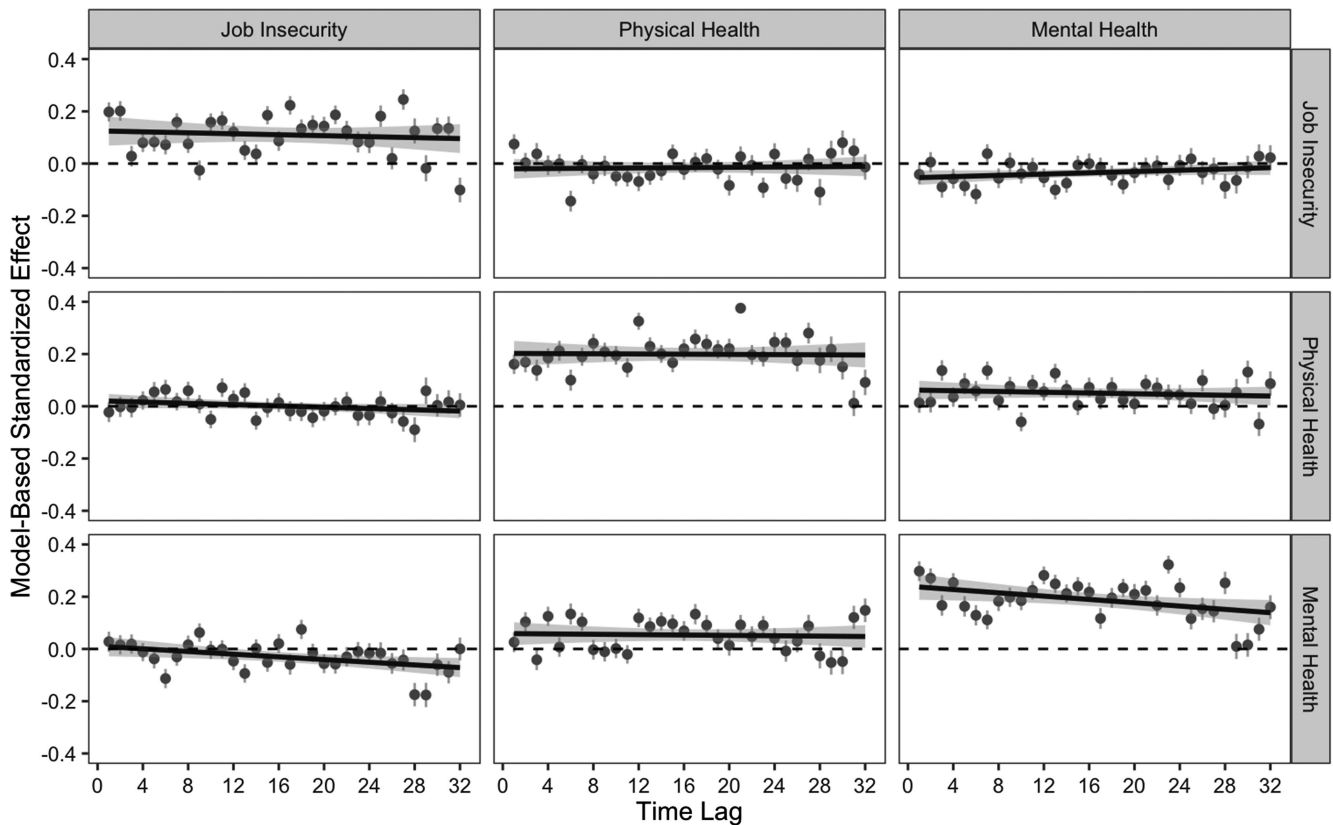
Note. $n = 1,666$. Plots along the diagonal represent autoregressive relations; off-diagonal plots represent cross-lagged relations following ("to" = row, "from" = column) matrix logic (e.g., cross-lagged relations *to* job insecurity *from* physical health are in row one, column two [1, 2]). Standardized estimates are depicted here to ensure consistent scaling across estimate parameters. Error bars/bands represent 95% confidence intervals.

Discussion

Our findings are in some ways consistent and in other ways inconsistent with theory and research on reciprocal relations between job insecurity and health. In line with between-person meta-analytic results (Sverke et al., 2002), we found that changes in job insecurity and changes in both physical and mental health over time were negatively related and that the association was stronger for mental health as compared to physical health. Our finding regarding a negative within-person influence of job insecurity on mental health is also consistent with the broader conclusion in the literature that job insecurity is detrimental to mental health (De Witte et al., 2016). Importantly, these findings are observed at the within-person level of analysis and are not accounted for by systematic between-person (average) influence of changes in job insecurity or mental health over time. Interestingly, the influence of job insecurity on mental health took some time to emerge (see Figure 4), which may suggest that the "cycle" of job insecurity affecting mental health itself is somewhat time-lagged.

We also find that both physical and mental health have negative within-person influences on job insecurity. These relations are consistent with the idea that the experience of poor health weakens one's perception that they can maintain continuity and stability of

employment, likely due to the combination of stressor creation and/or stressor perception processes (Guthier et al., 2020; Lang et al., 2011). In contrast to previous research and the current findings at the between-person level, we did not find a significant within-person influence of job insecurity on physical health. This suggests that deviations from people's own average level of job insecurity do not systematically impact overtime fluctuations in their physical health status. Although unexpected, this finding is to some extent consistent with research reporting nonsignificant associations between within-person variability in work-related poverty and self-rated physical health (Pförtner & Schmidt-Catran, 2017).

Evidence for linear trends in the within-person association between job insecurity and mental health suggests that declines in health increasingly led to higher job insecurity among employees. Theoretical advancements in this area should also consider that coping with job insecurity likely consumes mental health resources, which, in turn, may intensify the objective state and the subjective experience of job insecurity over time (Shoss & Vancouver, 2024). At the same time, the transactional stress model would suggest that the threat of worsening mental health problems may deepen over time. We also find positive, reciprocal within-person relations between physical and mental health, but the pattern of these

Figure 4

Negative Linear Trend (i.e., κ) in the Within-Person Relation From Job Insecurity to Mental Health
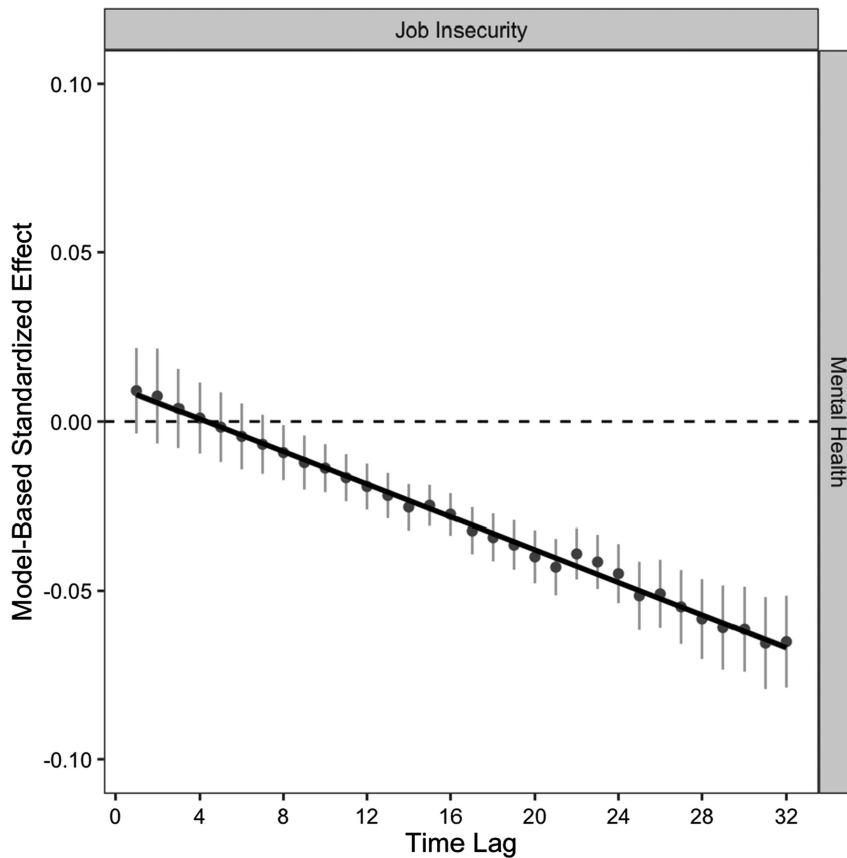
Note. $n = 1{,}666$. Standardized estimates are depicted here to ensure consistent scaling across estimated parameters. Error bars represent 95% confidence intervals.

within-person associations does not change systematically over time, suggesting that there is something about the nature of job insecurity and mental health that produces amplifying dynamics.

Considering the growth components of our model, we also find that job insecurity and physical health declined, and mental health increased, across time. These trajectories suggest positive advances as far as job security and mental health are concerned, which make sense given the historical context of this study (i.e., the easing of the COVID-19 pandemic in 2022). Future research may examine such trends over other large-scale societal changes (e.g., the introduction of artificial intelligence and automation technologies), which may present similar threats to job security for some employees (e.g., Mirbabaie et al., 2022).

Theoretical and Practical Implications

Overall, these findings suggest that the relation between job insecurity and health is complex and, particularly for mental health, reciprocal and intensifying over time. Although there is some degree of stability in health and job insecurity, there are key reciprocal

dynamics at play, especially between job insecurity and mental health for which an amplifying feedback process was observed. This empirical finding contributes to the continued development of dynamic models of stress processes (e.g., Guthier et al., 2020; Lazarus et al., 1985), especially those that propose cyclical and/or cumulative processes, such as the conservation of resources theory (e.g., Sonnentag & Meier, 2024). To date, little research has considered the specific form these dynamics might take, and our finding that the strength of the within-person associations between job insecurity and mental health amplifies over time provides an empirical guide that could help future research to offer more formal specifications of dynamic stress theories.

Practically, our findings should alert policymakers, considering the rise of both job insecurity and mental and physical health concerns among workers. In this vein, public health officials have begun to view employment conditions—particularly stable employment—as a critical contributor to public health. The World Health Organization has stated that "health and employment are inextricably linked" (see American Public Health Association, 2023). Our data supplement public health findings by providing psychological insights into how

these linkages occur within individuals and across time. Declining health makes it increasingly difficult over time to sustain secure work. Increasing insecurity makes it increasingly difficult over time to sustain health.

Interventions are needed to target *all* of these variables, especially focusing on ways to reduce job insecurity through government policies (e.g., speaking against "right to work" legislation), professional corporate communication, employee participation, provision of supervisor social support, or other multi-level interventions (Abildgaard et al., 2018; Van Egdom et al., 2022). At the same time, organizations can focus on buoying the physical and mental health of their employees, ideally by combining individual- and organizational-level interventions that comprehensively address various work and nonwork factors (Montano et al., 2014; Tetrick & Winslow, 2015).

Limitations and Directions for Future Research

This study has several strengths, including the focus on relatively long-term and reciprocal relations of job insecurity and both physical and mental health. However, our study also has some limitations. First, both job insecurity and health were self-reported by employees, and self-reports are prone to various biases (e.g., self-enhancement, common method). Future studies could explore the influence of more objective forms of job insecurity, such as organizational change or restructuring (Ferrie et al., 1998). Self-reported physical and mental health could be supplemented with more objective health measures, such as health-system contacts (e.g., general practitioner visits) and official disability status (Fischer & Sousa-Poza, 2006).

Second, our longitudinal study was carried out during the COVID-19 pandemic, which officially started in mid-March 2020 and was declared over by German government officials in April 2023. Our study design does not allow us to directly compare our findings to associations among job insecurity and health before or after the pandemic. It is possible that health-related and economic uncertainty during the pandemic led to greater variability in the focal study variables as compared to prepandemic times (e.g., Zacher & Rudolph, 2022). However, many of our findings are consistent with existing research, and future research conducted postpandemic could attempt to replicate and extend our findings.

Third, and related to the previous point, we cannot explain "why" systematic changes in the general trajectories of job insecurity and mental health occurred over time. For example, systematic changes may reflect developmental processes (i.e., dynamics associated with the normal process of aging) or the cumulative influence of exogenous "shocks" (see Zacher & Rudolph, 2022). To the former point, as people age, they tend to move into more secure jobs (Näswall & De Witte, 2003), whereas their physical health generally declines and their mental health improves (Beier et al., 2022). Consistently, we found evidence for on-average negative linear trajectories in physical health and positive linear trajectories in mental health over time, but also negative trajectories in job insecurity. The latter may possibly be explained by improvements in the pandemic situation. However, given the time frame of the present study (i.e., covering 2.5 years), it is doubtful that the changes observed here are due solely to developmental processes. Still, future research may consider whether and how initial levels of health and/or job insecurity modify the strength of downstream relations (e.g., considering how initial health symptom severity affects the experience of job insecurity over time).

Conclusion

This study contributes to the literature on dynamics in job insecurity and health by presenting the results of a unique longitudinal study with 33 monthly measurement points across 2.5 years among a large and representative sample of employees in Germany. Our results question the notion that the causal relation between job insecurity and health is unidirectional and instead suggest that research on job insecurity and health should refocus on reciprocal and dynamic overtime relations between these two important variables.

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