



Insights about mental health aspects at intralogistics workplaces – A field study

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ABSTRACT

The present field study investigated mental health aspects at intralogistics workplaces, as cognitive and social demands have largely changed in this branch. Within a cross-sectional, mixed methods study design, forty-one intralogistics employees completed a survey about their working conditions and mental states. Further, nine workers participated in a systematic, qualitative group interview to obtain intralogistics specific job resources and job demands. The results were compared to known mechanisms from a long-established psychological model (the Job-Demands and Resources model, JD-R model) to evaluate if these general assumptions still apply at modern working conditions. As expected and in line with the JD-R model, regression analyzes supported that job resources predicted work engagement ($p < .05$) and job demands predicted burnout symptoms ($p < .001$) even at modern intralogistics workplaces. However, no interaction effects (Job Demands X Job Resources) were found. The qualitative interviews highlighted several job demands and job resources, which were reported as especially relevant for modern intralogistics workplaces by the participants. Based on the findings, practical recommendations were evolved for the improvement of mental health at intralogistics workplaces. Job resources, for example process transparency or respectful and esteeming leadership behavior, can be increased in order to improve work engagement. Job demands, for example task interruptions, excessive time pressure or profuse exposure to physical stress should be controlled to reduce burnout symptoms.

1. Introduction

In modern times of globalization and digitalization, jobs are increasingly characterized by demands like performance pressure and/or the need to integrate flexibly into complex and permanently changing working conditions (Federal Ministry of Labour and Social Affairs (BMAS), 2015). As one result, mental stress-related complaints have increased in Germany, what brings along unfavorable consequences for individuals (suffering), economy (incapacities) and society (costs). Thus, work-related mental stress has moved into the focus of health and safety research and into the focus of operational practice. According to § 5 of the German Occupational Safety Act, employees must identify hazards and take adequate actions. Since 2013, mental hazards were explicitly included in this act. The instruments for mental health risk assessments are usually based on scientific concepts. Unfortunately, research about psychological aspects of work often focuses on white collar and knowledge based work.

Therefore, there is a growing need for practice-oriented research

about blue-collar work, particularly in the modern intralogistics branch, as working conditions have largely changed in this field (BMAS, 2015). Mainly due to the process of globalization, digitalization, increasing customer expectations, product diversity and shorter product cycles, the aggregated job demands increased. Even the working environments, as well as organizational- and technological framework conditions have changed, e.g. towards increasing automation and use of digital (smart-) devices.

In this context, only few research projects explicitly focused on the intralogistics branch. However, some recent studies found that today's employees in the intralogistics branch are comprehensively exposed to mentally stressful conditions like continuously repeating work processes, the necessity to work very quickly, deadline and performance pressure as well as low social support (e.g. Kretschmer et al., 2017; Yaşlıoğlu et al., 2013). As a result, workers in the intralogistics branch continuously need to adapt to complex and permanently changing working conditions. Further, those mental working conditions are strongly correlated with mental health, general health, and job

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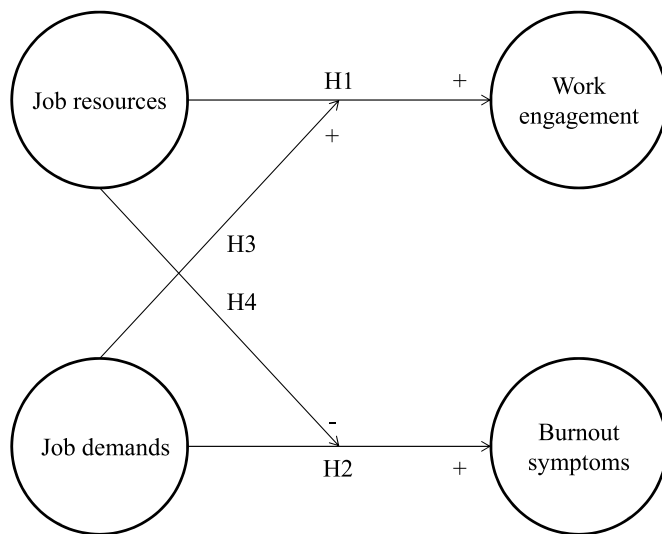


Fig. 1. The hypothesized model (based on the job demands-resources model; Bakker and Demerouti, 2007).

satisfaction (Hartwig and Mamrot, 2018).

1.1. Aim of the present study

While the afore mentioned studies mainly relied on large empirical data sets with telephone interviews across all branches, the present paper approached to investigate mental health conditions of intralogistics workers with a highly practice-orientated field study and tailored questionnaires for the branch. The main aim of the present study was to gain insights about psychological working conditions in the intralogistics work, their correlations with health outcomes and to evaluate if the principles of a long established psychological model, namely the Job-Demands-Resources-Model (JD-R model; Demerouti et al., 2001), still apply for the specific context of modern intralogistics workplaces.

1.2. Theoretical background

The aforementioned Job-Demands-Resources-Model is one prominent concept explaining the relationship of job characteristics and mental health at work (for a recent review, see Bakker and Demerouti, 2017). Central aspects of the model are the job characteristics, which can be categorized as either a job resource or a job demand: Job demands are defined as those physical, psychological, social, and organizational aspects of the job that require physical and/or psychological effort and are thus associated with certain physiological and/or psychological costs. Whereas, job resources are those aspects that are functional in achieving work goals, reduce job demands and the associated physiological and psychological costs, or stimulate personal growth, learning and development (Bakker, 2011).

Following the JD-R model, job resources and job demands prompt two different processes. For instance, job resources provoke a motivational process and determine work engagement, whereas job demands provoke a health-impairment and determine burnout symptoms. Further, the JD-R model predicts moderating effects in that way that job resources can buffer the effect of job demands on burnout symptoms, and that job demands can boost the effect of job resources on work engagement (Hakanen et al., 2005). Since these principles should also be valid for the specific context of intralogistics workplaces, the following hypotheses were formulated:

1.3. Hypotheses

1. In the specific context of intralogistics workplaces, job resources determine work engagement.
2. In the specific context of intralogistics workplaces, job demands determine burnout symptoms.
3. In the specific context of intralogistics workplaces, job demands moderate the effect of job resources on work engagement, in that way that high (vs. low) job demands would increase the impact of job resources on work engagement.
4. In the specific context of intralogistics workplaces, job resources moderate the effect of job demands on burnout symptoms, in that way that high (vs. low) job resources would decrease the impact of job demands on burnout symptoms.

A graphical representation of the derived study hypotheses is displayed in Fig. 1.

2. Method

As study design, a cross-sectional, mixed methods research approach was chosen.

In order to test the study hypotheses, intralogistics workers of a German company completed a survey, measuring job characteristics as well as employee engagement and health outcomes. In addition, a systematic group interview was conducted, to obtain supplemental information about specific intralogistics demands and discuss possible intervention to optimize work.

The study design was inspected and then permitted by the ethics committee of the Federal Institute for Occupational Safety and Health (BAuA).

Not participating did not result in any consequences for the workers. Further, the participants could exit the study at any time, without the declaration of reasons and without any inherent consequences.

2.1. Sample

The study was performed at a medium-sized logistics company, located in the south of Germany. The company was acquired as part of a funded research project, in collaboration with the Federal Institute for Occupational Safety and Health, Germany. In order to achieve the greatest possible practical relevance, only intralogistics workers were included. The company has two intralogistics departments, with a total of $N = 44$ workers. The main tasks in the intralogistics departments consist of receiving, storing and issuing industrial goods.

The total sample of workers who completed the survey voluntarily and anonymously was $n = 41$. Three workers (6.8%) refused to take part in the study. In order to support anonymity, participants had the chance to skip demographical questions and age was indicated not exactly, but in spans of age. However, most participants answered each of the questions. 68.3% answered to be female, 26.8% were male and two participants did not report their sexes. Participants' ages were allocated as following: 4.9% up to 24 years, 14.6% from 25 to 34 years, 14.6% from 35 to 44 years, 39.0% from 45 to 54 years and 26.8% from 55 to 64 years. 58.5% were employed permanently (29.3% fixed-term employment, 12.2% no answer to this question) and 48.8% reported to work on a full-time contract (43.9% part-time employment, 7.5% no answer to this question). Additional context variables were not assessed to ensure anonymity within the relatively small sample size.

For the group interviews, the authors and the company agreed on two group interviews with up to five participants each to balance out different perspectives of the employees, feasible discussions and productivity loss resulting from the study. Nine employees volunteered for the interviews, resulting in one interview with four, and the other interview with five employees.

2.2. Measures

2.2.1. Quantitative measures

Job demands, Job resources, Work engagement, and Burnout symptoms were assessed as main variables, using a questionnaire based on the “Short Questionnaire for Job Analysis” (KFZA; Prümper et al., 1995) and the “Copenhagen Psychosocial Questionnaire” (COPSOQ; Nübling et al., 2005). The survey language was German, the full list of translated items is provided in the appendix, Tables A.1 - A.4.

2.2.2. Job demands and Job resources

Job demands and job resources were measured using the Short Questionnaire for Job Analysis, which is an empirically grounded and common instrument for measuring critical job characteristics. The original questionnaire consists of eleven subscales with 26 items in total. Examples for the scales are *Decision latitude*, *Collaboration* and *Qualitative workload*. Each of the scales was assigned to as either job resource or job demand. In the present study, the used scales were aggregated to the collective variables *Job resources* and *Job demands*. This decision was supported by Cronbach’s alpha consistency checks, which indicated *Job resources* ($\alpha=.89$) and *Job demands* ($\alpha=.74$) as reliable variables. The collective variable *Job resources* contained 7 subscales with a total of 18 items, whereas the collective variable *Job demands* contained 4 subscales with a total of 8 items. The translation of all used items is presented in the appendix, Table A.1 and Table A.2.

2.2.3. Work engagement and Burnout symptoms

Work engagement and burnout symptoms were measured using specific subscales from the *Copenhagen Psychosocial Questionnaire*, which was chosen because of its broad validation, scope and brevity. The internal consistency of the items were checked with Cronbach’s alpha. *Work engagement* consisted of three items, with an internal consistency of $\alpha=.92$, whereas *Burnout symptoms* consisted of three items with an internal consistency of $\alpha=.88$. The translation of all used items is presented in the appendix, Table A.3 and Table A.4.

The items of both KFZA and COPSOQ were rated on 5-point Likert scales (KFZA: 1 = ‘not accurate at all’, 5 = ‘completely accurate’; COPSOQ: 1 = ‘never’, 5 = ‘always’).

2.2.4. Regression models

As a prerequisite for the quantitative analysis, it was tested and confirmed, that requirements to calculate regression models (e.g., collinearity, distribution of errors, homogeneity of variance and linearity) were met. In order to test the hypotheses, two hierarchical regression models were conducted. Job demands and job resources functioned as independent variables in the multiple regression models. The dependent variable was *Work engagement* in the first of the models and *Burnout symptoms* in the second model. *Job resources* and *Job demands* were z-transformed to have equal weight in the analysis and the interaction term was computed (cf., Aiken et al., 1991) in order to check their combined contribution to the model. In both of the models, *Job resources* and *Job demands* were entered at the first stage and the interaction term at the second stage.

2.2.5. Qualitative measures

The qualitative group interviews served as complementary part to the preceding surveys. The volunteering participants were divided in two groups, with respect to group homogeneity in such that age, sex, period of employment and job satisfaction would be approximately balanced between the two groups. Demographic information was not recorded in order to ensure anonymity. The procedure was based on the *Ideas Meeting Concept* (Berger, 2010), in which interviewees are asked about positive and negative determining factors of their current work situation. The guideline for the semi-standardized interview focused on the relevant working demands and resources identified in the questionnaire results. First, the participants were asked to find examples of

Table 1

Descriptive statistics, internal consistencies and correlations among variables (N = 41).

Variable	M	SD	α	1.	2.	3.	4.
1. Job resources	3.19	.77	.89	–			
2. Job demands	2.89	.81	.74	-.32*	–		
3. Work engagement	3.4	1.21	.92	.48**	-.30	–	
4. Burnout symptoms	2.95	1.05	.85	-.44**	.66**	-.42**	–

Note. Items rated on a five-point Likert scale from ‘not accurate at all’ to ‘completely accurate’. *p < .05, **p < .01.

Table 2

Summary of multiple regression model for variables predicting Work engagement. Only complete datasets were evaluated (N = 39).

Variable	B (SE)	β	p	R ²	ΔR^2	ΔF^2	p
Step 1							
Age	8.18 (4.21)	.32	.10	.11	.11	2.13	.13
Sex	-24.07 (12.61)	-.36	.06				
Step 2							
Age	8.65 (4.21)	.34	.05	.37	.26	6.83	<.01
Sex	-6.32 (12.35)	-.10	.61				
Job resources	14.96 (5.72)	.39	.01				
Job demands	-12.03 (6.30)	-.33	.06				
Step 3							
Age	8.61 (4.30)	.34	.05	.37	.01	.01	.93
Sex	-6.27 (12.56)	-.09	.62				
Job resources	14.78 (6.14)	.38	.02				
Job demands	-12.09 (6.41)	-.33	.07				
Job resources X Job demands	.66 (7.05)	.01	.93				

what these demands typically mean in their specific working environment and what aspects could be improved. Participants then talked about how these factors could be improved. One special procedure of these group interviews was that each of the participants was asked to answer each of the questions separately before continuing with the group discourse. Not answering a question was valid and did not result in any consequences for the participant. The aggregated answers were documented by the interviewer and evaluated later.

2.3. Procedure

In advance of the survey, the workers were extensively informed about the circumstances, purpose and procedure of the study as well as the terms of privacy protection. The agreeing participants were provided with paper-pencil versions of the questionnaires. Completing the surveys took approximately 20 min. The systematic group interviews were performed two weeks later. The completion took about 90 min for each group.

The participants took part during their working hours (imputed to the working time) and did not receive further compensation. After filling the surveys and - where applicable - completing the group interviews, the participants continued with their normal work. The evaluation of the results was carried out separately.

Table 3
Summary of multiple regression model for variables predicting Burnout symptoms. Only complete datasets were evaluated (N=38).

Variable	B (SE)	β	p	R ²	ΔR^2	ΔF^2	p
Step 1				.21	.21	4.58	.02
Age	1.04 (4.03)	.05	.80				
Sex	25.01 (10.34)	.44	.02				
Step 2				.50	.29	9.26	<.01
Age	-.61 (3.33)	-.03	.86				
Sex	4.89 (9.76)	.09	.62				
Job resources	-9.53 (4.56)	-.28	.05				
Job demands	17.14 (5.08)	.53	<.01				
Step 3				.50	.01	.20	.66
Age	-.33 (3.43)	-.02	.92				
Sex	5.02 (9.89)	.09	.62				
Job resources	-8.60 (5.07)	-.25	.10				
Job demands	17.12 (5.14)	.53	<.01				
Job resources X Job demands	-2.62 (5.91)	-.06	.66				

3. Results

3.1. Descriptive statistics

Descriptive statistics and correlations among the four collective variables are presented in Table 1.

3.2. Results of the hypothesis testing regression models

The first of the regression models revealed that the control variables age and sex were no significant predictors for Work engagement at the first step. *Job resources* and *Job demands* together contributed significantly to the regression model and accounted for a change of 26% of the variation in *Work engagement* at the second stage. Entering the interaction term at the third stage did not contribute significantly. The only significant predictor was *Job resources*, indicating that *Job resources* determined work engagement, which is in line with *Hypothesis 1*. However, job demands did not moderate this effect, which leads to the rejection of *Hypothesis 3*. The related statistics are presented in Table 2.

The second of the models revealed that the demographic variables explained a significant share of variation in *Burnout symptoms* at the first step. *Job resources* and *Job demands* together contributed significantly to the regression model and accounted for a change of 29% of the variation at the second stage. Entering the interaction term at the third stage did not contribute significantly. For the demographic variables, only sex showed to be a significant predictor, whereas *Job demands* was the only significant predictor of the two job characteristics. The results are consistent with *Hypothesis 2*. However, *Job resources* did not moderate the effect of *job demands* on *Burnout symptoms*, which leads to the rejection of *Hypothesis 4*. The related statistics are presented in Table 3.

3.3. Results of the qualitative-systematic group interviews

The aggregated open replies from the systematic group interview revealed several aspects, which were assigned to as either job resources or job demands.

Mentioned job resources were good collaboration, support by colleagues, sports offers, bonus payments and company celebrations. Regarding the importance of the factors, the participants reported a

clear priority of good social interactions and support by their colleagues. While the incentives were perceived as beneficial and pleasant, it was the quality of the everyday interaction with the colleagues that had a constant impact on the participant's motivation and well-being in the company.

Mentioned job demands were time pressure, lack of transparency, low wages, task interruptions, physical stress, and disregard. The participants gave a very differentiated account of these factors and their impact. About the factors that are inherent in the job activity like time pressure and physical stress, the participants reported perceived strain from these aspects. However, participants also expressed their understanding that their job activities are associated with these factors and they accepted them. Factors like lack of transparency or poor work system design leading to increased interruptions were perceived by the employees not only as causing strain per se, but also perceived as signs of little appreciation and support from the organization. The participants reported these factors as especially difficult to accept and demotivating.

4. Discussion

As outlined in the introduction, modern working conditions have largely changed within the past years. In particular, the job demands at intralogistics workplaces have extensively increased. The aim of the present study was to gain insights about mental health related interrelationships in this specific branch. The cross sectional, mixed-methods approach was chosen, due to the boundary conditions given with the underlying research and development project "Previlog" (for details see chapter "Acknowledgements", subheading "funding"). It was expected that the quantitative part would support the theoretical assumptions of the long-established JD-R Model even for the subsample of modern intralogistics work, and the qualitative part should add supplementary intralogistics specific information.

The participants rated their experienced levels of different job demands and job resources, as well as their respective levels of work engagement and burnout symptoms. The evaluation of the questionnaires results show medium average self-assessments for all scales, revealing neither a ceiling nor bottom effect of the questionnaire in the specific sample.

In line with the JD-R model and with hypothesis 1 and hypothesis 2, the results indicated that job resources predict work engagement and job demands to predict burnout symptoms, even in modern intralogistics workplaces. Hence, hypothesis 1 and hypothesis 2 were accepted.

Following hypothesis 3 and 4, it was expected that job resources would decrease the effect of job demands on burnout symptoms and conversely that job demands would increase the effect of job resources on work engagement. However, moderating effects of job resources and job demands on the alternate process were not found. While the central studies, which revealed the interaction effects, had sample sizes of N = 1012 (Bakker et al., 2005) and N = 1919 (Hakanen et al., 2005), only n = 41 participants were included in the present study. In the two of the studies, statistically significant interaction terms ranged from $\Delta R^2 = .003$ to $.01$, which is within a comparable range to the results from the present study ($\Delta R^2 = .002$ and $.003$). This leads to the assumption that the expected moderating effects might only occur with a larger sample size. A bigger sample size was inapplicable within the chosen approach, through focusing exclusively on the subsample of real workers in this specific branch. Hence, hypothesis 3 and hypothesis 4 were denied.

4.1. Practical relevance

Based on the known mechanisms from the JD-R model, the results from the surveys were analyzed, to derive practical recommendations for the branch. Two general recommendations were derived for the optimization of mental health at workplaces:

First, companies that are interested in engaged employees should optimize job resources, as job resources are correlated with work

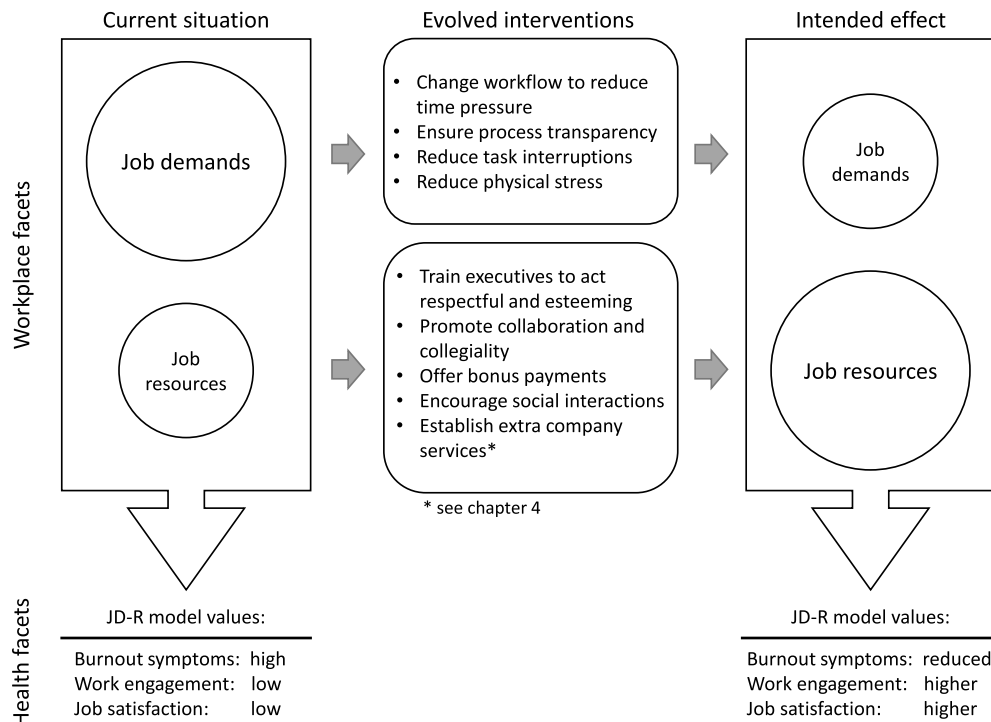


Fig. 2. Visualization of the conclusion, derived from the mixed-methods approach. The evolved practical recommendations are presented in the mid column.

engagement. This is in line with the theoretical assumption that job resources prompt a motivational process, meaning that employees who experience many resources at their workplace will be high in work engagement.

Second, companies should optimize job demands. As study results supported a connection between job demands and mental health, job demands seem to prompt a health-impairment process, meaning that employees who experience too intense demands at their workplace tend to be more exhausted and will be more likely to experience burnout symptoms.

The performed interviews revealed several aspects of intralogistics workplace specific demands and resources, which added supplemental value to the general recommendations stated above: Important job resources for intralogistics workers are good collaboration and support by colleagues, which might be summarized as social aspects of the job. Further, sports offers, bonus payments and company celebrations count as job resource, which might be summarized as extra company services. Named critical job demands are lack of transparency, low wages and disregard, which might be summarized as organizational appreciation. Other participants reported high levels of time pressure, task interruptions, and physical stress, which might be altered by the organizational work system design.

Based on the theoretical background and the aggregated answers of the group interviews, the following practical recommendations were evolved for the branch:

- Possible interventions to optimize job demands: change the workflow to reduce time pressure, ensure process transparency and reduce task interruptions as well as physical stress.
- Possible interventions to promote job resources: Train executives to act respectful and esteeming, promote collaboration and collegiality, offer bonus payments, encourage social interactions and establish extra company services.

Further recommendations for good work system design and general operational practice can be received from the *Federal Institute for Occupational Health and Safety* (BAuA; e. g., [Rothe et al., 2017](#)), and/or the

Common German Occupational Safety Strategy (GDA; visit: http://www.gda-psyche.de/DE/Service/English/english_node.html).

4.2. Limitations and chances for future research

Besides the outlined limitation regarding the sample size, the study evaluation revealed some aspects, that might be addressed in future research.

As indicated by the two regression models, only limited variance of *work engagement* and *burnout symptoms* was explained by the predictors *Job resources* and *Job demands*. Hence, additional variables should be regarded in future research projects. Following the JD-R model, certain personal resources may have similar effects on work engagement and exhaustion like job resources do and might therefore be considered equal to job resources. Further, job performance is postulated by the JD-R model to result from positive versus negative mental states. The validation of this linkage was not applicable within the present study due to privacy protection aspects.

In the statistical calculations, causal effects are assumed in that way that job characteristics (e.g. *Job resources* and *Job demands*) determine certain employee outcomes (e.g. *Work engagement* and *Burnout symptoms*). Supplementary from that, [Demerouti et al. \(2001\)](#) also described reversed causal effects, in that way that *Work engagement* and *Burnout symptoms* would affect *Job resources* and *Job demands*. From this perspective, highly engaged workers would proactively increase job resources through job crafting behavior ("gain spiral"; [Tims et al., 2012](#)), and highly exhausted workers would increase job demands through self-undermining behavior ("loss spiral"; [Bakker and Costa, 2014](#)). This outlines a chance for future research, as the evaluation of reversed causal effects might contribute to the understanding of mental health interrelationships and the development of intervention measures.

5. Conclusion

Despite the outlined limitations, the results derived from the present study still appear to be of practical relevance. It was shown that central conditions of the JD-R model still apply for modern intralogistics

workplaces. The survey results supported that the evaluated job resources determined work engagement and the job demands determined burnout symptoms. Anticipated interaction effects were not found in this context, most probably because of a too small sample size. Nevertheless, the qualitative assessed results of the systematic group interviews were able to highlight several job demands and job resources that are especially feasible for intralogistics workplaces. Concerning the demand, this included activity-inherent stress factors like high physical stress, but also organizational factors like low transparency. Participants reported a higher acceptance for those demand factors that were associated with the activity per se, while the organizational factors were of higher concern. Based on these findings, some practical recommendations for possible mental health related interventions were developed to support a better balance between job demands and job resources. Especially when activity-related stress factors are difficult or impossible to change, it is of utmost importance to ensure the humane work organization of these activities (see Fig. 2).

The gained knowledge and derived practical recommendations of this study might support responsible practitioners, when trying to design or improve the working conditions or the work-system design. Further, the results might be used as reference, especially when there is a need to justify mental health related improvements in front of the accountable person or working group. Hence, the study results should be considered when designing or improving intralogistics workplaces.

Appendix

Table A 1

List of translated items measuring Job resources (based on the Short Questionnaire for Job Analysis ("Kurz-Fragebogen zur Arbeitsanalyse" (KFZA); Prümper et al., 1995)

	n	α	M	SD
Overall scale: <i>Job resources</i>		.92		
Scale: <i>Decision latitude</i>		.80		
1. If you consider your activity as a whole, to what extent can you determine the order of the work steps yourself?	38		3,05	1,37
2. How much influence do you have on what work is assigned to you?	37		2,24	1,42
3. Can you plan and organize your work independently?	37		2,38	1,46
Scale: <i>Versatility</i>		.51		
4. Can you learn new things in your work?	39		3,31	1,30
5. Can you use your knowledge and skills in your work?	38		3,55	1,11
6. In sum, in my work, I have many different, changing work tasks.	39		3,31	1,38
Scale: <i>Holism</i>		.38		
7. In my work I see myself in the result of whether my work was good or not.	38		3,71	1,31
8. I have the opportunity to produce a complete work product from start to finish.	36		2,94	1,58
Scale: <i>Social backing</i>		.76		
9. I can rely on my colleagues when things get difficult at work.	40		3,40	1,50
10. I can rely on my direct supervisors when things get difficult at work.	39		3,28	1,50
11. There is a good relationship in the department.	40		3,34	1,37
Scale: <i>Collaboration</i>		.76		
12. This work requires close cooperation with other colleagues in the company.	38		3,16	1,49
13. I can talk with colleagues about work and private matters while working.	38		2,68	1,38
14. I always get feedback from supervisors and colleagues about the quality of my work.	37		3,11	1,41
Scale: <i>Employee information and participation</i>		.61		
15. Do I get the opportunity from my immediate supervisor to help me design or improve my work?	36		3,72	1,30
16. The work in my company is fairly distributed.	37		3,62	0,99
Scale: <i>Company service</i>		.65		
17. In my company, I can express my opinion about tasks and procedures openly.	37		3,76	1,04
18. I receive appropriate recognition for the work I have done.	36		3,03	1,16

Note. Rated on a five-point Likert scale from 'not accurate at all' to 'completely accurate'; Cronbach α in the present study is directly indicated at the scales.

Declarations of competing interest

The authors declare that there is no conflict of interest.

CRediT authorship contribution statement

Matthias Hartwig: Conceptualization, Methodology, Formal analysis, Investigation, Writing - original draft, Writing - review & editing, Visualization, Supervision, Project administration, Funding acquisition. **Manuel Wirth:** Methodology, Formal analysis, Investigation, Resources, Data curation, Writing - original draft, Visualization. **Dominik Bonin:** Writing - review & editing, Visualization.

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Table A 2

List of translated items measuring Job demands (based on the Short Questionnaire for Job Analysis (“Kurz-Fragebogen zur Arbeitsanalyse” (KFZA); Prümper et al., 1995)

	n	α	M	SD
Overall scale Job demands		.74		
Scale: <i>Qualitative workload</i>		.69		
1. In this work, there are things that are too complicated.	39		2,38	1,31
2. There are too high demands on my ability to concentrate.	35		2,80	1,32
Scale: <i>Quantitative workload</i>		.64		
3. I am often under time pressure.	37		3,22	1,19
4. I have too much work.	37		3,43	1,39
Scale: <i>Task interruptions</i>		.32		
7. Often, I do not have the information, materials, and resources (such as computers) I need.	34		2,21	1,34
8. I am interrupted again and again in my actual work.	38		2,29	0,98
Scale: <i>Environmental stresses</i>		.60		
9. At my workplace there are unfavorable environmental conditions, such as noise, climate, dust.	38		3,57	1,24
10. At my workplace, rooms and interior design are insufficient.	37		3,76	1,26

Note. Rated on a five-point Likert scale from 'not accurate at all' to 'completely accurate'; Cronbach α in the present study is directly indicated at the scales.

Table A 3

List of items measuring Work engagement (based on the Copenhagen Psychosocial Questionnaire (COPSOQ; Nübling et al., 2005)

	n	α	M	SD
Overall scale: <i>Work engagement</i>		.92		
1. I am full of energy in my work.	40		66,88	31,21
2. I am enthusiastic about my work.	39		56,41	32,30
3. I totally go into my work.	37		56,10	36,04

Note. Rated on a five-point Likert scale from 0 to 100 (0, 25, 50, 75, 100); Cronbach α in the present study is directly indicated at the scales.

Table A 4

List of items measuring Burnout symptoms (based on the Copenhagen Psychosocial Questionnaire (COPSOQ; Nübling et al., 2005)

	n	α	M	SD
Overall scale: <i>Burnout symptoms</i>		.88		
1. How often are you physically exhausted?	39		56,41	26,73
2. How often are you emotionally exhausted?	34		44,23	28,37
3. How often do you feel drained?	41		46,32	29,60

Note. Rated on a five-point Likert scale from 0 to 100 (0, 25, 50, 75, 100); Cronbach α in the present study is directly indicated at the scales.

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