

A Service of

ZBW

Leibniz-Informationszentrum Wirtschaft Leibniz Information Centre for Economics

Uhlmann, Lena Marie; Karabinski, Tina; Wendsche, Johannes; Wegge, Jürgen

Article — Published Version In what ways does age-differentiated leadership influence employee health?

Zeitschrift für Arbeitswissenschaft

Provided in Cooperation with: Springer Nature

Suggested Citation: Uhlmann, Lena Marie; Karabinski, Tina; Wendsche, Johannes; Wegge, Jürgen (2023) : In what ways does age-differentiated leadership influence employee health?, Zeitschrift für Arbeitswissenschaft, ISSN 2366-4681, Springer, Berlin, Heidelberg, Vol. 77, Iss. 3, pp. 429-439, https://doi.org/10.1007/s41449-023-00375-5

This Version is available at: https://hdl.handle.net/10419/309285

Standard-Nutzungsbedingungen:

Die Dokumente auf EconStor dürfen zu eigenen wissenschaftlichen Zwecken und zum Privatgebrauch gespeichert und kopiert werden.

Sie dürfen die Dokumente nicht für öffentliche oder kommerzielle Zwecke vervielfältigen, öffentlich ausstellen, öffentlich zugänglich machen, vertreiben oder anderweitig nutzen.

Sofern die Verfasser die Dokumente unter Open-Content-Lizenzen (insbesondere CC-Lizenzen) zur Verfügung gestellt haben sollten, gelten abweichend von diesen Nutzungsbedingungen die in der dort genannten Lizenz gewährten Nutzungsrechte.



WWW.ECONSTOR.EU

https://creativecommons.org/licenses/by/4.0/

Terms of use:

Documents in EconStor may be saved and copied for your personal and scholarly purposes.

You are not to copy documents for public or commercial purposes, to exhibit the documents publicly, to make them publicly available on the internet, or to distribute or otherwise use the documents in public.

If the documents have been made available under an Open Content Licence (especially Creative Commons Licences), you may exercise further usage rights as specified in the indicated licence.



WISSENSCHAFTLICHE BEITRÄGE



In what ways does age-differentiated leadership influence employee health?

Lena Marie Uhlmann¹ · Tina Karabinski¹ · Johannes Wendsche² · Jürgen Wegge¹

Accepted: 28 June 2023 / Published online: 18 August 2023 © The Author(s) 2023

Abstract

According to Wegge et al. (2014), leadership behavior can affect employee health in several ways. The model describes leaders (1) as actors with a direct influence on the health of employees, (2) as designers of work systems, (3) as a moderating factor (buffer/amplifier) of the effects of work requirements and resources on health, (4) as a developer of group climate and identification and (5) as direct role models for health-related behavior. In order to collect evidence for the usefulness of this multi-path model, connections between age-differentiated leadership (ADL) and health were analyzed in 947 employees of a German technology company. ADL is a management style that takes into account the particularities of mixed-age teams and also differentiates between the different needs of different age groups. It was found that better ADL (when controlling for employee-oriented leadership) is associated with fewer physical and psychological complaints (pathway 1). This relationship is mediated by the manager's social support (path 2) and a better recreational climate in the team (path 4). Better ADL also reduced the negative effects of psychological work demands on the psychological symptoms (pathway 3). *Practical Relevance*: This article provides practical evidence for the multi-way model of leadership and health. Using the example of age-differentiated leadership (ADL)—with control of employee-oriented leadership—it was also found that this leadership behavior has a positive effect on the mental and physical health of employees via four different paths and should therefore be encouraged.

Keywords Health · Age-differentiated leadership · Recovery climate

Lena Marie Uhlmann, M.Sc. lena_marie.uhlmann@tu-dresden.de

¹ Fakultät Psychologie, Professur für Arbeits- und Organisationspsychologie, TU Dresden, Zellescher Weg 17, 01069 Dresden, Germany

² Fachbereich 3 "Arbeit und Gesundheit", Bundesanstalt für Arbeitsschutz und Arbeitsmedizin, Fabricestr. 8, 01099 Dresden, Germany

Auf welchen Wegen beeinflusst alter(n)sgerechtes Führungsverhalten die Mitarbeitergesundheit?

Zusammenfassung

Nach Wegge et al. (2014) kann Führungsverhalten die Gesundheit von Angestellten auf mehreren Wegen beeinflussen. Das Modell beschreibt Führungskräfte (1) als Akteure mit direktem Einfluss auf die Gesundheit der Mitarbeitenden, (2) als Gestalter von Arbeitssystemen, (3) als moderierender Faktor (Puffer/Verstärker) der Auswirkungen von Arbeitsanforderungen und Ressourcen auf die Gesundheit, (4) als Entwickler von Gruppenklima und Identifikation und (5) als direkte Vorbilder für gesundheitsrelevantes Verhalten. Um Belege für die Nützlichkeit dieses Mehrwegemodells zu sammeln, wurden Zusammenhänge zwischen der alter(n)sgerechten Führung (ADL) und der Gesundheit bei 947 Beschäftigten eines deutschen Technologieunternehmens analysiert. ADL ist ein Führungsstil, der die Besonderheiten altersgemischter Teams berücksichtigt und zudem zwischen unterschiedlichen Bedürfnissen verschiedener Altersgruppen differenziert. Es zeigte sich, dass eine bessere ADL (bei Kontrolle von mitarbeiterorientierter Führung) mit weniger körperlichen und psychischen Beschwerden einhergeht (Pfad 1). Diese Beziehung wird mediiert durch die soziale Unterstützung der Führungskraft (Weg 2) und ein besseres Erholungsklima im Team (Weg 4). Bessere ADL pufferte zudem die negativen Auswirkungen von psychischen Arbeitsanforderungen auf die psychischen Beschwerden ab (Weg 3).

Praktische Relevanz: Dieser Beitrag erbringt praktische Belege für das Mehrwegemodell zu Führung und Gesundheit. Am Beispiel der alter(n)sgerechten Führung (ADL) – bei Kontrolle von mitarbeiterorientierter Führung – zeigte sich zudem, dass sich dieses Führungsverhalten über vier verschiedene Pfade positiv auf die mentale und physische Gesundheit von Beschäftigten auswirkt und daher gefördert werden sollte.

Schlüsselwörter Gesundheit · Alter(n)sgerechte Führung · Erholungsklima

1 Introduction

1.1 Leadership and employee health

Time at work takes up a large portion of most people's lives and consequently has a large influence on workers wellbeing and health. The influential job demands-resources model (JDR, Bakker and Demerouti 2007; Demerouti and Nachreiner 2019) suggest that various work demands lead to strain for the individual. If there are not enough personal and organizational resources, this strain can translate into adverse outcomes for the individual's health. The role of leadership for employee's health is not considered in the original JDR, but since leaders have a major influence on work design and overall work conditions for their subordinates, they also strongly influence their health and wellbeing for better or worse (Montano et al. 2017). A recent meta-analysis including 243 samples from 203 studies investigated, for example, the role of transformational leadership in the JDR model (Teetzen et al. 2022). It was found that job demands had a mediating effect between leadership and negative employee well-being while job resources more strongly mediated the relationship between leadership and positive well-being. This illustrates that leadership has broad and multidirectional influences on employee health.

The most elaborated model describing potential relationships between leadership and health of employees was developed by Wegge et al. (2014). There, five key pathways were proposed by which leadership behavior and employee health is linked. Firstly, in dyadic, interpersonal interactions leaders promote or aggravate their subordinate's health in a direct way, e.g., by engaging in praise or workplace bullying. Secondly, leaders influence job design and organizational resources that benefit or harm employees overall, for example, by providing support for difficult work tasks. Thirdly, leaders can take moderating actions to mitigate or amplify the effects of organizational stressors, such as imposing strict deadlines on an already challenging project. Fourthly, leaders influence also the climate at the workplace by crafting a shared identity and cultivating health-related common perceptions within teams. Using the example of recovery climate (Sonnentag et al. 2022; Wendsche et al. 2021; Wendsche 2023), this would be, for example, the shared standard within the team of responding to e-mails even when you are off work or on vacation. Fifthly, the leader acts as a direct role model by exemplifying specific health related behavior, e.g., always observing his or her own work breaks (Wegge et al. 2014). This paper jointly investigates the first four pathways (role modelling was not measured in the data set, see below) focusing on the potential benefits of age-differentiated leadership.

1.2 Age-differentiated leadership

Due to demographic changes companies in Germany face the challenges of having an aging and shrinking workforce that also becomes increasingly age-heterogeneous (e.g., by age-diverse work teams). Therefore, leadership must strive for promoting life-long employability and minimizing agerelated conflicts at work. These goals can be achieved by using the leadership style of age-differentiated leadership (ADL) which has been originally introduced by Tuomi et al. (1997). Here, ADL was defined in four different areas: (1) having an open-minded, non-stereotypical attitude towards age, (2) high willingness to cooperate, (3) ability to plan work individually, and (4) good communication skills. Wegge et al. (2012) extended this approach by incorporating (a) also principles for leading age-diverse teams and (b) by not only focusing on the needs of older employees, but taking into account also the needs of younger and middle-aged age groups (see Wegge et al. 2018). In a first study among 192 German nurses, better ADL was negatively associated with emotional conflicts and turnover intentions and related positively to psychological well-being and experiences of personal professional efficiency. In another study of 106 manufacturing workers, better ADL reduced intentions to leave and was associated with greater job satisfaction and higher self-efficacy (Wegge et al. 2012). Several other studies replicated such positive relationships (for a recent summary, see Jungmann and Wegge 2023). Using this extended ADL-approach of Wegge et al. (2012), also longitudinal evidence from the early stages of the COVID-19 pandemic revealed that older worker's employability benefitted from better ADL when controlling for the quality of the Leader-Member-Exchange (LMX; see Koziel et al. 2021). Because of the promising effects of ADL on employability and wellbeing, this leadership style was chosen to examine a multiple-pathways model of leadership and health.

2 The current study

The purpose of this study is to test a multiple-pathway model of leadership and health by specifically focusing on age-differentiated leadership. For the first pathway (direct influence), it was investigated if ADL is negatively related to physical and mental health complaints and explains additional variance in health outcomes over and above employee-oriented leadership (EOL). When introducing a new leadership construct, it is important to control for prior, common approaches of leadership assessment to ensure discriminant validity and revealing the potential of explaining incremental variance with the new construct. In this study, therefore EOL was included as a control variable, as a leadership style measuring the extent to which the supervisor is accessible to his/her subordinates, whether he/she treats them with respect and fairness and whether the supervisor gives sufficient feedback (Emmermacher 2008). There are, of course, similar components in ADL but the special consideration of different age groups or age-diversity in teams is missing in EOL. In order to test the second pathway (leaders as designers of work systems), it was investigated if social support mediates the relationship between ADL and health complaints. For the third pathway (leaders as moderating factors of the effects of work demands on health), it was analyzed if ADL moderates the relationships between physical and mental work demands and physical and mental health complaints. The fourth pathway of the model describes a leaders' influence on the climate at the workplace by crafting a shared identity and cultivating health related common perceptions within teams. To examine this path in this study, recovery climate was used as a mediator. This relatively new facet of work climate is about employees' shared perceptions of the extent to which the organization cares about employee recovery and how well the legal requirements are realized (Karabinski 2023). The climate for recovery also includes the team members' shared perceptions relating to the general importance of recovery from work and the situational conditions for recovery at their workplace. This perception is supposed to be shaped by the extent to which recovery-promoting behavior is supported, rewarded and expected at the workplace. The goal of a good recovery climate is to protect and promote employees' ability to recover through the implementation of organizational policies, procedures and practices, thereby contributing to improved employee health.

A visualization of the research model and the corresponding hypotheses can be found in Fig. 1. Based on the theories and findings summarized above, the five following hypotheses are:

Hypothesis 1 ADL is negatively associated with (a) physical and (b) mental health complaints, even after adjusting for age, gender and EOL (pathway 1).

Hypothesis 2 The relationship between ADL and (a) physical and (b) mental health complaints is mediated by supervisor social support (pathway 2).

Hypothesis 3 There is a positive relationship between physical and mental work demands and (a) physical and (b) mental health complaints.

Hypothesis 4 The relationship between physical and mental work demands and (a) physical and (b) mental health complaints is moderated by ADL, in such a way that the relationship is weaker if there is higher ADL (pathway 3).

Hypothesis 5 The relationship between ADL and (a) physical and (b) mental health complaints is mediated by team recovery climate (pathway 4).

Fig. 1 Research Model. (*ADL* Age-differentiated leadership. Control variables: age, gender, employee-oriented leadership (*EOL*). Numbers refer to pathways in the fivepathway model) **Abb. 1** Forschungsmodell



3 Methods

3.1 Procedure

Data was collected during a health survey in one plant of a large German energy group in Berlin. Data acquisition took place from January 20th to January 31st 2020 during official working hours. Employees with access to a computer received an invitation via e-mail to participate in an online questionnaire on the platform "SoSci Survey (oFb—der onlineFragebogen)". Employees without access to a computer had the opportunity to participate with a paper-pencil-questionnaire administered at their workplace. Participation was voluntary and anonymous. The employees received no further compensation. All participants provided informed consent. The survey instrument, the evaluation procedure and feedback were determined jointly between the research team, the works council and the company representatives.

3.2 Participants

A total of 1261 employees responded but, for these analyses, 218 were excluded since they had leadership responsibility themselves. Further 96 individuals had to be excluded due to incorrect completion (e.g., not fully completed). This resulted in a final sample of 947 employees (women: 25.6%; age: M=43.0, SD=10.8). Most of them (68.1%) were office workers, 21.2% were manufacturing workers, and 10.7% worked in other areas (e.g., distribution).

3.3 Measures

3.3.1 Physical health complaints were assessed with the Gießener Beschwerdebogen (Brähler and Scheer 1995) that measures health on four subscales: physical exhaustion, stomach complaints, rheumatic pains, and heart com-

plaints. Participants indicated on a four-point-Likert-scale how often they have been impaired by each symptom in the last two weeks. A sum score of all 24 items was calculated.

3.3.2 Mental health complaints were assessed using the short form of the depression, anxiety and stress-scale (DASS-21, Nilges and Essau 2015). DASS-21 is a well-established instrument to assess the core symptoms of depression, anxiety and stress, respectively with seven items. Participants indicated on a five-point-Likert-scale how much they have been impaired by each symptom in the last two weeks. For analysis, a sum score of all 21 items was calculated.

3.3.4 Age differentiated leadership (ADL) was assessed with the short version of the "Fragebogen zur alter(n)sgerechten Führung" (Wegge et al. 2018). The eight items were answered on a five-point-Likert-scale (e.g., "My direct supervisor encourages a positive cooperation between younger and older employees"). Young employees are defined as under 31 years old, middle-aged employees are between 31 and 49 years old, and older employees are over 50 years old. The total score is the mean over all items.

3.3.5 Social support of the direct supervisor was assessed with items from the Salutogenetische Subjektive Arbeitsanalyse (SALSA, Rimann and Udris 1997). Participants answered three questions on a four-point-Likert-scale about how much their direct supervisor listens and supports them for work problems. The social support scale is the mean over the three items.

3.3.6 Recovery climate on the team level was assessed with seven items taken from a current doctoral dissertation by co-author T. Karabinski (2023). Participants indicated on a five-point-Likert-Scale how much their direct supervisor supported, rewarded and expected recovery conductive be-

havior in the workplace, for example, "My direct supervisor puts emphasis on staff members taking breaks during work". The RC scale is the mean over these seven items.

3.3.7 Physical work demands employees experience trough external characteristics of their work were assessed with eight items from the SALSA (Rimann and Udris 1997). Participants were asked to rate how much they feel impaired by the stressors on a six-point Likert scale ranging from "1=does not occur." to "6=very strongly". The included stressors were noise, bad lighting, uncomfortable temperature, irregular working times (e.g., on-call, weekends), deficient work equipment, working a long time on screens, disturbances through air conditioning, and uncomfortable working posture. The PD scale is the mean over these eight items. This additive approach over a broad spectrum of stressors is suitable since physical work demands were defined as a formative measure (Diamantopoulos et al. 2008).

3.3.8 Mental work demands were assessed with five items from the Effort Reward Imbalance Scale (Siegrist et al. 2019). Participants were asked to rate how much they feel impaired by the mental demands on a five-point Likert scale ranging from "1=does not occur." to "5=very strongly". The five mental demands were time pressure, interruptions at work, high responsibility at work, working overtime, and increased workload. The MD scale is the mean over these five items.

3.3.9 Employee oriented leadership (EOL) as a control variable was used to see whether ADL has additional explanatory value for the outcomes. It was measured with three items from the "Inventar zur betrieblichen Gesundheitsförderung" (Emmermacher 2008). Participants indicated whether they receive feedback by their direct supervisor, whether they receive help doing their work and whether the direct supervisor is easily accessible on a five-point-Likert-scale. The EOL scale is the mean over these three items.

3.3.10 Demographics Participants reported their age in years, gender, whether they had leadership responsibility themselves, their main occupation (production worker, office worker, other) and the division they were working in.

3.4 Statistical analyses

Data were analysed with the software IBM SPSS Statistic (version 27), using the PROCESS Macro (Hayes 2018) to assess the indirect effects of the mediators. Only complete cases were included. The level of significance was set at $\alpha = 0.05$. Pearson's correlations between variables of interest

were examined, and effect sizes were interpreted as r = 0.13 moderate, and r = 0.32 strong effects (Bosco et al. 2015). Originally, the hierarchical data structure in the analyses was also considered, i.e., employees working in 15 different divisions. The intraclass correlation (ICC) of the model should be larger than 0.050 to allow for multilevel analysis (Raudenbush and Bryk 2002). The ICCs for physical complaints were 0.005, and for mental complaints 0.003. Since these values were well below the minimum of 0.050, the requirements for multilevel analyses were not met, the multilevel data structure was not considered further in the analyses.

Hierarchical regression analyses were conducted for each outcome variable, after adjusting for age, gender and EOL. Five hierarchical regressions were tested to examine if the following variables explain variance in the outcomes: (1) Model 1: only the control variables, (2) Model 2: Model 1+ADL, (3) Model 3: Model 2+physical and mental demands and their interaction-terms with ADL, (4) Model 4: the mediators (social support, recovery climate), and (5) Model 5: full model with controls, ADL, physical demands, mental demands, interactions, social support, and recovery climate.

4 Results

Variable means, standard deviations, scale reliabilities and correlations are displayed in Table 1. Where applicable Cronbach's alpha was calculated to measure the reliability of the scales. The scales for ADL, physical health complaints, mental health complaints, and social support all had excellent reliabilities. The reliabilities for the recovery climate, mental demands, and EOL scale were acceptable. For physical demands no reliability was calculated since it was defined as a formative measure (Diamantopoulos et al. 2008).

There were high intercorrelations with r > 0.50 between the two outcome variables physical and mental health complaints, r=0.78, and the two leadership styles ADL and EOL, r=0.71. There were also high correlations between social support and ADL, r=0.72, as well as social support and EOL, r=0.77 (all with p < 0.001).

Therefore, we tested the conceptual distinctiveness of, first, both health outcome variables and, second, both leadership behaviors and supervisor support using confirmatory factor analysis with MPlus.

First, considering health complaints, data fit of a 2factor solution with physical and mental health complaints as distinctive factors ($X^2(944) = 8234.174, p < 0.001$, RMSEA = 0.090, CFI = 0.703, TLI = 0.689, SRMR = 0.074) was superior to a 1-factor solution with all items loading on one latent health complaints factor ($X^2(945) = 9408.302$,

	cutiotinen.	,			aer or	aaron arnac						
Variable	М	SD	Reliability	1	2	3	4	5	6	7	8	9
1 ADL	3.69	0.85	0.92	-	-	-	-	_	_	-	-	-
2 Physical com- plaints	4.64	3.51	0.92	-0.23**	-	-	-	-	-	-	-	-
3 Mental com- plaints	4.13	3.50	0.94	-0.28**	0.78**	-	-	-	-	-	-	-
4 Social Support	2.98	0.81	0.91	0.72**	-0.27**	-0.33**	-	-	-	-	-	-
5 Recovery Cli- mate	3.31	0.67	0.77	0.49**	-0.26**	-0.26**	0.44**	-	-	-	-	-
6 Physical De- mands	3.31	0.69	-	-0.31**	0.31**	0.24**	-0.34**	-0.26**	-	-	-	-
7 Mental Demands	2.44	0.87	0.80	-0.24**	0.31**	0.31**	-0.30**	-0.23**	0.35**	-	-	_
8 Age	42.99	10.88	-	-0.03	0.08**	0.08*	-0.06*	0.00	0.08*	0.15**	-	_
9 Gender	0.74	0.44	-	-0.01	-0.11**	-0.11**	0.03	0.01	0.02	-0.07*	0.14**	_
10 EOL	3.29	0.90	0.76	0.71**	-0.23**	-0.28**	0.77**	0.45**	-0.29**	-0.24**	-0.03	0.01

Table 1	Descriptive Statistics,	Reliabilities, and Correlations for Study Variables
Tab. 1	Deskriptive Statistiken.	Reliabilitäten und Interkorrelationen der Studienvariablen

N=947. Gender was coded as 0 = female, 1 = male. The reliabilities of the different scales are listed as Cronbach's alpha

ADL Age Differentiated Leadership, EOL Employee Oriented Leadership

*p<0.05, **p<0.01

p < 0.001, RMSEA = 0.097, CFI = 0.656, TLI = 0.639, SRMR = 0.08; $\Delta X^2(1) = 1174.128$, p < 0.001).

Second, a 3-factor solution with ADL, EOL and supervisor support as separate factors ($X^2(74) = 840.24$, p < 0.001, RMSEA = 0.105, CFI = 0.920, TLI = 0.902, SRMR = 0.039) fit the data significantly better than a 1-factor-solution ($X^2(77) = 1742.964$, p < 0.001, RMSEA = 0.151, CFI = 0.827, TLI = 0.795, SRMR = 0.06; $\Delta X^2(3) = 902.964$, p < 0.001).

In sum, this means that although some of our variables were highly correlated, data revealed they represent different constructs.

The new recovery climate measure correlated positively with ADL (r=0.49, p<0.01) and supervisor social support (r=0.44, p<0.01) and negatively with health complaints (both r=-0.26, p<0.01).

4.1 Pathway 1: Direct relationships between ADL and health

The first hypothesis, representing pathway 1 of the model, proposed that ADL is negatively associated with (a) physical and (b) mental health complaints, after controlling for age, gender and EOL. There was a medium correlation between ADL and *physical health* complaints, r=-0.23, p<0.001. Results of hierarchical linear regression analyses (Table 2) showed that adding ADL in the second step after the control variables resulted in a significant increase in explained variance in physical health complaints, $\Delta R^2 = 0.01$. Hence, ADL related significantly negatively with physical health complaints ($\beta = -0.15$). For the relationship between ADL and *mental health* a slightly stronger negative correlation was found, r=-0.28, p<0.001. The hierarchical linear regression analysis adding ADL in the second step

after the control variables resulted again in a significant increase in explained variance in mental health complaints, $\Delta R^2 = 0.02$, and ADL significantly negatively related with physical health complaints ($\beta = -0.18$).

Thus, Hypothesis 1a and 1b were supported.

4.2 Pathway 2: Indirect influence through social support

Hypothesis 2, representing the second path of the model, stated that the relationship between ADL and (a) physical and (b) mental health complaints is mediated by social support of the supervisor. ADL is a significant positive predictor of social support, as can be seen in Table 3, step 2, $\beta = 0.32$, p < 0.001. Social support in turn negatively related to physical health complaints ($\beta = -0.19$; see Table 2, step 4) as well as mental health complaints ($\beta = -0.26$). To examine the indirect effect of ADL on outcome variables through social support, a mediation analysis was conducted using the PROCESS SPSS macro. The results can be found in Table 4. There was no significant indirect effect for physical health complaints, B = -0.03, 95% CI [-0.07, 0.01]. In contrast, the indirect effect for mental health complaints was significant, B = -0.05, 95% CI [-0.09, -0.01].

Hypothesis 2 was supported for mental health complaints, but not for physical health complaints.

4.3 Pathway 3: ADL moderating adverse health effects of work demands

Hypothesis 3 stated the underlying assumption of pathway 3. Firstly, focusing on physical work demands, there was a medium-sized correlation between ADL and phys-

Table 2	Results of Hierarchical Regression Analyses for Physical and Mental Complaints as Outcome Variables
Tab. 2	Ergebnisse der Hierarchischen Regressionsanalysen für körperliche und mentale Beschwerden als Kriterien

Variable	Step 1		Step 2		Step 3		Step 4		Step 5	
	B	SE B	В	SE B	В	SE B	В	SE B	В	SE B
Physical Complaints										
Age	0.09**	0.03	0.09**	0.03	0.05	0.03	_	-	0.06	0.03
Gender	-0.12**	0.03	-0.13**	0.03	-0.11**	0.03	-	_	-0.11**	0.03
Employee Oriented Leader- ship (EOL)	-0.22**	0.03	-0.12**	0.04	-0.07	0.04	-	-	-0.01	0.05
Age-Differentiated Leadership (ADL)	-	-	-0.15**	0.04	0.14	0.15	-	-	0.25	0.15
Physical Demands (PD)	-	_	_	_	0.27*	0.13	_	-	0.27*	0.13
Mental Demands (MD)	-	-	-	-	0.38**	0.14	-	-	0.38**	0.13
ADL×PD	-	-	_	_	-0.10	0.16	-	_	-0.12	0.16
ADL×MD	-	-	-	-	-0.21	0.14	-	-	-0.23	0.14
Mediator: Social Support	-	-	-	-	-	-	-0.19**	0.03	-0.08	0.05
Mediator: Recovery Climate	-	_	_	_	-	-	-0.17**	0.03	-0.13**	0.03
R^2	0.07		0.08		0.17		0.10		0.19	
F for R^2	24.81**		11.18^{**}		24.69**		50.65**		21.47**	
Mental Complaints										
Age	0.08**	0.03	0.08**	0.03	0.05	0.03	-	-	0.05	0.03
Gender	-0.11**	0.03	-0.12**	0.03	-0.10**	0.03	-	-	-0.09**	0.03
EOL	-0.27**	0.03	-0.15**	0.04	-0.12**	0.04	-	_	-0.03	0.05
ADL	-	-	-0.18**	0.04	0.12	0.14	-	_	0.24	0.15
Physical Demands (PD)	-	_	_	_	0.11	0.13	_	-	0.11	0.13
Mental Demands (MD)	-	_	_	_	0.53**	0.14	_	-	0.52**	0.13
ADL×PD	-	-	_	_	-0.03	0.16	-	_	-0.06	0.16
ADL×MD	-	_	-	_	-0.35*	0.14	-	_	-0.37*	0.14
Mediator: Social Support	-	_	-	_	-	_	-0.26**	0.03	-0.15**	0.05
Mediator: Recovery Climate	-	_	-	_	-	_	-0.14**	0.03	-0.11**	0.03
R^2	0.09		0.11		0.17		0.12		0.19	
F for R^2	32.88**		16.40**		17.73**		66.38**		21.77**	

N=947. All variables were z-standardized

p < 0.05, p < 0.01

Table 3	3 Results of Hierarchical Regression Analyses for Variables Predicting the Mediators Social Support and Recovery Climate
Tab. 3	Ergebnisse der Hierarchischen Regressionsanalysen für Prädiktoren der Mediatoren Soziale Unterstützung und Erholungsklima

Variable	Social Sup	oport			Recovery Climate				
	Step 1		Step 2		Step 1		Step 2		
	В	SE B	В	SE B	В	SE B	В	SE B	
Age	-0.04*	0.02	-0.03	0.02	0.01	0.03	0.03	0.03	
Gender	0.03	0.02	0.03	0.02	0.00	0.03	0.00	0.03	
Employee oriented leadership	0.76**	0.02	0.50**	0.03	0.45**	0.03	0.17**	0.04	
Age-differentiated leadership (ADL)	-	-	0.32**	0.09	-	-	0.63**	0.13	
Physical demands (PD)	-	-	-0.05	0.08	-	-	0.07	0.12	
Mental demands (MD)	-	_	-0.11	0.09	-	-	0.10	0.13	
ADL×PD	-	-	-0.03	0.10	_	-	-0.20	0.15	
ADL×MD	-	-	0.04	0.09	-	-	-0.21	0.13	
<i>R</i> ²	0.59		0.66		0.20		0.29		
F for R^2	449.49**		40.46**		77.53**		22.73**		

N=947. All variables were z-standardized

p < 0.05, p < 0.01

Table 4	Results of Mediation	Analyses with	Indirect Effect	s of Social	Support an	d Recovery	Climate for	Relationships	between	Age-
different	tiated Leadership and I	Physical and M	lental Complair	nts						

Tab. 4	Ergebnisse	der Mediationsar	nalysen mit in	direkten Effektei	n von Sozialer	Unterstützung	und Erholung	sklima für o	die Beziehungen
zwisch	en Alter(n)s	differenzierter Fü	ihrung und kö	rperlichen und m	entalen Besch	werden			

	Physical C	Complaints		Mental Complaints				
Effect	B	SE	95% CI	95% CI		SE	95% CI	
			Lower	Upper			Lower	Upper
Direct	0.25	0.15	-0.04	0.54	0.24	0.15	-0.05	0.52
Total	-0.11*	0.04	-0.19	-0.05	-0.11*	0.04	-0.19	-0.05
Indirect Social Support	-0.03	0.02	-0.07	0.01	-0.05*	0.02	-0.09	-0.01
Indirect Recovery Climate	-0.08*	0.03	-0.15	-0.03	-0.07*	0.03	-0.12	-0.02

N=947. All variables were z-standardized

p < 0.05, p < 0.01

ical health complaints, r=0.31, p<0.001, as well as with mental health complaints, r=0.24, p<0.001 (see Table 1). Secondly, mental work demands correlated moderately with physical health complaints, r=0.31, p<0.001, as well as with mental health complaints, r=0.31, p<0.001. This is in support of Hypothesis 3.

Hypothesis 4 proposed that ADL is a *moderator* for the relationship between work demands and health complaints. It was expected that the relationship would be weaker if employees report higher ADL. As shown in Table 2 (step 5), for physical health complaints the interaction terms of demands and ADL were not significant suggesting no moderating effect of ADL. For mental health complaints as outcome, the interaction term of physical work demands and ADL was not significant but the interaction term of mental work demands and ADL reached significance, $\beta = -0.37$, p = 0.011. A visualization of this moderator effect is depicted in Fig. 2. The relation of mental work demands and

mental health complaints is shown for low, medium and high levels of ADL. When higher levels of ADL are reported, the relationship between demands and complaints gets weaker, suggesting that ADL is a moderating variable reducing adverse mental health effects of mental work demands.

Regarding Hypothesis 4, only one of the four predicted interactions was significant. The relationship between mental work demands and mental health complaints is moderated by ADL in such a way that the relationship is weaker if there is stronger ADL.

4.4 Pathway 4: Indirect influence through recovery climate

Hypothesis 5, representing the fourth path of the model, stated that the relationship between ADL and (a) physical and (b) mental health complaints is mediated by team

Fig. 2 The Interaction of Mental Work Demands and Age-differentiated Leadership predicting Mental Health Complaints. (*Moderator ADL* Age differentiated leadership. Levels of the moderator ADL are M+1 SD (high) and M-1 SD (low)) **Abb. 2** Die Interaktion von Mentalen Arbeitsanforderungen und Altersdifferenzierter Führung für die Vorhersage von Mentalen Beschwerden



recovery climate. ADL related significantly positive with recovery climate (Table 3, step 2, β =0.63, p<0.001). Recovery climate, in turn negatively related to physical health complaints (see Table 2, step 4, β =-0.17, p<0.001), as well as mental health complaints, β =-0.14, p<0.001. The results regarding indirect effects of recovery climate for relationships between ADL and the outcome variables are shown in Table 4. There was a significant indirect effect for physical health complaints, B=-0.08, 95% CI [-0.15, -0.03], as well as for mental health complaints, B=-0.07, 95% CI [-0.12, -0.02]. Thus, Hypothesis 5 was supported.

5 Discussion

5.1 General discussion of results

This study investigated a multiple-pathway model trough which leadership can influence employee health by specifically focusing on the age-differentiated leadership approach (ADL).

Regarding the first pathway, that proposes a direct influence of leadership on health, it was found as expected that ADL was negatively associated with physical and mental health complaints and explains additional variance in these outcomes above age, gender and EOL. Therefore, for leaders, it is not only important to lead each employee individually, to support and listen to him or her, as outlined in EOL, but also to pay attention to the needs of all different age groups.

The second pathway describes leaders as designers of the work system. It was investigated whether social support is a mediator for the relationship between ADL and health, which was the case for mental health complaints, but not physical health complaints. Thus, the support provided by the leader seems to be mainly a resource for mental health, while other job resources (e.g. ergonomic equipment and work environment) might be more important for physical health.

The third pathway suggests that ADL can mitigate the positive relationship between work demands and health complaints. First, it was found that both types of work demands (physical and mental) were associated with more health complaints, as proposed by the JDR model (Bakker and Demerouti 2007). There was no interaction effect of ADL for relationships between physical work demands and (physical and mental) health complaints and mental work demands and physical health. However, the relationship between mental work demands and physical health. However, the relationship between mental work demands and mental health complaints was affected by levels of ADL in such a way that the relationship was weaker, if employees reported stronger ADL. This is a positive finding since it implies that ADL is indeed a possible organizational variable reducing and shaping the

adverse influence of high mental work demands, such as time pressure and high workload, on mental health. Again, ADL seems to be mainly a resource for mental health, while physical health is influenced by other factors in this study.

The fourth pathway in the model described leaders as developers of group climate. It was examined whether a positive team recovery climate was a mediator for the relationship between ADL and health. This was the case for both mental and physical health complaints. This means that leaders showing better ADL leadership behavior also create a better team recovery climate by providing their subordinates with a shared sense of the importance of recovery, which in turn leads to fewer health complaints. The new recovery climate scale correlated positively with favored variables such as ADL and supervisor social support and negatively with health complaints. This suggests convergent validity, which bolsters the assumption to consider such a team climate measure.

5.2 Strengths and limitations

The study has some limitations that need to be considered. The sample is self-selected and subjective self-report measures were used. The authors tried to counteract this problem by using prior validated scales to measure the study constructs as far as possible and by collecting data anonymously. In addition, the cross-sectional study design does not allow for causal conclusions regarding the variables' relationships. Since no structural equation models were calculated, this study does not investigate the five ways of leadership model as a whole but rather provides empirical evidence for each path separately. The authors are also aware that ADL includes-at least from a theoretical point of view-also the team-level. Privacy requirements of the investigated company did not allow to collect information on the exact team membership of the employees, but only the broad division employees worked in. Therefore, the requirements for a multilevel analysis were checked based on these 15 divisions but there was not enough variance in the outcomes on the division level. However, it should be also considered that the sample is quite large and consisted of different occupations including production and office workers. A final limitation is that the fifth pathway of the model, leaders as role models, could not be tested in this study. However, this study was able to provide empirical evidence for the other four pathways of the model in a field setting.

6 Conclusions and implications

The current study was able to provide empirical support for the multiple-pathway leadership-employee health model (Wegge et al. 2014). It was found that supervisors leading in an age-differentiated manner had a direct positive influence on employees mental and physical health, as well as indirectly through providing social support and crafting a better team recovery climate. Age-differentiated leadership could also reduce (moderate) the negative influences of mental work demands on mental health. Thus, the relationship between leadership behavior and employee health is multifaceted and complex. Finally, here are some recommendations for future research as well as for practice.

For future research, it would be useful to gather evidence on the models' fifth pathway suggesting leaders as role models and investigate the whole model using structural equation modelling. Moreover, longitudinal studies are necessary to examine the causal direction of the proposed relationships. Future research should ideally also employ multilevel designs by collecting data including the team structure in a variety of different occupational fields.

Some implications of the results for practice are that ADL is beneficial for employee health and reduces the negative influences of *mental* work demands on mental health. Thus, companies should try to foster and promote ADL among leaders. A validated leadership training is available in German and English language and results of an intervention study with this approach revealed that the training improved team functioning and performance (Jungmann et al. 2020). One important insight is that employees reporting a stronger recovery climate reported also more favorable health outcomes. Thus, it can be expected that this is an important protective factor for employee health. The manager as role model is central to the development and improvement of the team recovery climate. He or she shapes the environment for the enforcement of national recoveryrelated safety and health standards (e.g., Working Time Directive; Wendsche et al. 2022) so that employees feel safe to take breaks when they need to, without fear of being seen as lazy or weak. The same applies to recovery, how it is communicated and exchanged within the team. Companies should aim to inform leaders about the importance of recovery, especially in how to improve their subordinates recovery attitudes and behavioral control, which both predict recovery intentions and recovery behavior (Blasche et al. 2021). Furthermore, it is a favorable organizational strategy to offer all employees the opportunity to participate in evidence-based recovery trainings (Karabinski et al. 2021).

In sum, this study gives new insights on the hidden tracks how (age-differentiated) leadership can promote employee health, even under situations when work demands are high.

Funding Open Access funding enabled and organized by Projekt DEAL.

Open Access This article is licensed under a Creative Commons Attribution 4.0 International License, which permits use, sharing, adapta-

tion, distribution and reproduction in any medium or format, as long as you give appropriate credit to the original author(s) and the source, provide a link to the Creative Commons licence, and indicate if changes were made. The images or other third party material in this article are included in the article's Creative Commons licence, unless indicated otherwise in a credit line to the material. If material is not included in the article's Creative Commons licence and your intended use is not permitted by statutory regulation or exceeds the permitted use, you will need to obtain permission directly from the copyright holder. To view a copy of this licence, visit http://creativecommons.org/licenses/by/4. 0/.

References

- Bakker AB, Demerouti E (2007) The job demands-resources model: state of the art. J Manag Psychol 22:309–328
- Blasche G, Wendsche J, Tschulik T, Schoberberger R, Weitensfelder L (2021) Individual determinants of rest-break behavior in occupational settings. Healthcare 9:1330
- Bosco FA, Aguinis H, Singh K, Field JG, Pierce CA (2015) Correlational effect size benchmarks. J Appl Psychol 100:431–449
- Brähler E, Scheer JW (1995) Der Gießener Beschwerdebogen (GBB), 2nd edn. Huber, Bern
- Demerouti E, Nachreiner F (2019) Zum Arbeitsanforderungen-Arbeitsressourcen-Modell von Burnout und Arbeitsengagement – Stand der Forschung. Z Arb Wiss 73:119–130
- Diamantopoulos A, Riefler P, Roth KP (2008) Advancing formative measurement models. J Bus Res 61:1203–1218
- Emmermacher A (2008) Gesundheitsmanagement und Weiterbildung: Eine praxisorientierte Methodik zur Steuerung, Qualitätssicherung und Nutzenbestimmung. Gabler
- Hayes AF (2018) Introduction to mediation, moderation, and conditional process analysis: A regression-based approach, 2nd edn. Guilford
- Jungmann F, Wegge J (2023) Führung von altersgemischten Arbeitsgruppen. In: Felfe J, van Dick R (eds) Handbuch Mitarbeiterführung. Springer, Berlin
- Jungmann F, Wegge J, Liebermann S, Ries B, Schmidt KH (2020) Improving team functioning and performance in age-diverse teams: Evaluation of a leadership training. Work Aging Retire 6:175–194
- Karabinski T (2023) Erholungsklima als Determinante gesundheitsund sicherheitsförderlicher Organisationsgestaltung. TU Dresden, Dresden (Unveröffentlichte Dissertation)
- Karabinski T, Haun VC, Nübold A, Wendsche J, Wegge J (2021) Interventions for improving detachment from work: a meta-analysis. J Occup Health Psychol 26:224–242
- Koziel RJ, Friedrich JC, Rudolph CW, Zacher H (2021) Age-differentiated leadership and healthy aging at work: evidence from the early stages of the COVID-19 pandemic. Int J Environ Res Public Health 18:12509
- Montano D, Reeske A, Franke F, Hüffmeier J (2017) Leadership, followers' mental health and job performance in organizations: a comprehensive meta-analysis from an occupational health perspective. J Organ Behav 38:327–350
- Nilges P, Essau C (2015) Die Depressions-Angst-Stress-Skalen. Schmerz 29:649–657
- Raudenbush SW, Bryk AS (2002) Hierarchical linear models: Applications and data analysis methods vol 1. SAGE, Thousand Oaks
- Rimann M, Udris I (1997) Salutogenetische Subjektive Arbeitsanalyse (SALSA). ETH Zürich
- Siegrist J, Li J, Montano D (2019) Psychometric properties of the Effort-Reward Imbalance Questionnaire. Zugegriffen: 29. Jul. 2022 https://www.uniklinik-duesseldorf.de/fileadmin/Fuer-Patientenund-Besucher/Kliniken-Zentren-Institute/Institute/Institut_fuer_

Medizinische_Soziologie/Dateien/ERI/ERI_Psychometric-New. pdf. Accessed 29 July 2022

- Sonnentag S, Cheng BH, Parker SL (2022) Recovery from work: advancing the field toward the future. Annu Rev Organ Psychol Organ Behav 9:33–60
- Teetzen F, Bürkner PC, Gregersen S, Vincent-Höper S (2022) The mediating effects of work characteristics on the relationship between transformational leadership and employee well-being: a meta-analytic investigation. Int J Environ Res Public Health 19:3133
- Tuomi K, Ilmarinen J, Martikainen R, Aalto L, Klockars M (1997) Aging, work, life-style and work ability among Finnish municipal workers in 1981–1992. Scand J Work Environ Health 23:58–65
- Wegge J, Schmidt KH, Piecha A, Ellwart T, Jungmann F, Liebermann S (2012) Führung im demografischen Wandel. Rep Psychol 37:344–354
- Wegge J, Shemla M, Haslam SA (2014) Leader behavior as a determinant of health at work: Specification and evidence of five key pathways. Ger J Hum Resour Manag 28:6–23

- Wegge J, Emmermacher A, Döbler A, Fritzsche L, Kügler J, Nowak J (2018) Arbeitsfähigkeit, Arbeitsmotivation und Führung älterer Mitarbeiter: Stand der Forschung und neue Entwicklungen. In: Knieps F, Pfaff H (eds) BKK Gesundheitsreport 2018: Arbeit und Gesundheit Generation 50. Medizinisch Wissenschaftliche Verlagsgesellschaft, pp 190–201
- Wendsche J (2023) Erholungsförderliche Einflussfaktoren für Fachund Führungskräfte. In: Moser M, Häring K (eds) Gesund bleiben in kranken Unternehmenssystemen. Springer, Wiesbaden
- Wendsche J, de Bloom J, Syrek C, Vahle-Hinz T (2021) Always on, never done? How the mind recovers after a stressful work day? Ger J Hum Resour Manag 35:117–151
- Wendsche J, Lohmann-Haislah A, Schulz A, Schöllgen I (2022) Violation of German rest break regulation criteria and health complaints while working in the office and from home. Sozialpolitikch 2022(2):1–29